SPECIAL NEWS FOCUS ON MALARIA

20 October 2000

Science

Vol. 290 No. 5491
Pages 397–660 $8

Building the Future Through Science, Engineering, and Technology

AAAS Annual Meeting and
Science Innovation Exposition

15–20 February 2001
San Francisco, CA

AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE

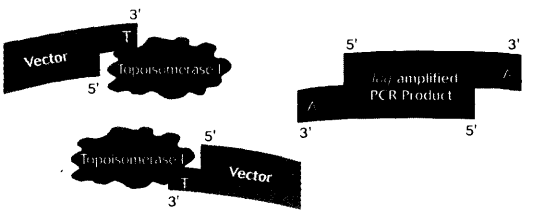
PCR cloning results you can count on.

Day after day with TOPO TA Cloning®

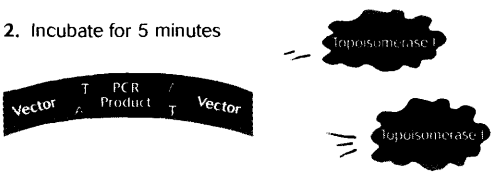
When you're cloning PCR products, you not only want great results, you want results you can rely on—every time. That's what you get with TOPO TA Cloning® Kits.

Reliable. Invitrogen's patented TOPO® Cloning technology uses topoisomerase I rather than DNA ligase for faster, more successful ligations. So you can say goodbye to the variables caused by ligase-mediated cloning and get reproducible results every time you clone.

1. Combine a TOPO TA Cloning® vector and your PCR Product



2. Incubate for 5 minutes



3. Ligation is complete

>95% Recombinants. With TOPO TA Cloning®, you're just 5 minutes away from great results. And with optimized vectors, you get >95% recombinants the first time, every time.

With unrivaled consistency and speed, TOPO TA Cloning® delivers—day in and day out. To learn more about the revolutionary TOPO TA Cloning® and our host of other TOPO® Cloning products, call Invitrogen today.

Invitrogen™
living science

Circle No. 34 on Readers' Service Card

United States Headquarters:
1600 Faraday Avenue
Carlsbad, California 92008
Tel: 1 760 603 7200
Tel (Toll Free): 1 800 955 6288
Fax: 1 760 602 6500
Email: tech_service@invitrogen.com
www.invitrogen.com

European Headquarters:
Invitrogen BV
P.O. Box 2312
9704 CH Groningen
The Netherlands
Tel: +31 (0)50 5299 299
Fax: +31 (0)50 5299 281
Email: tech_service@invitrogen.nl

European Toll Free Numbers:
Order line 00800 5456 5456
Technical support 00800 5345 5345
Fax number 00800 7890 7890

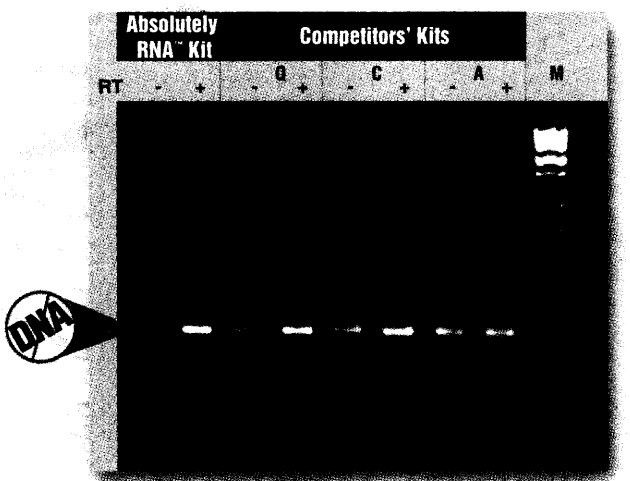
Distributors:
Australia 1 800 882 555
Czech Republic 2 727644 16
Finland 09 584 121
Hungary 01 280 3728
Israel 02 584 1111
Italy 02 38 1951
Japan 03 5684 1620
Korea 02 3471 6500
Poland 058 341 4726
Portugal 021 453 7085
Spain 091 729 0333
Taiwan 080 231 530

All other countries see our website: www.invitrogen.com

Absolutely RNA!

Pure RNA without DNA

Absolutely RNA™
RT-PCR MINIPREP KIT



Accurate RT-PCR Results with the Absolutely RNA™ RT-PCR Kit
Only the Absolutely RNA RT-PCR miniprep kit gives a true negative result in the absence of reverse transcriptase (RT). The other kits would require additional treatment and purification to generate reliable RT-PCR results.

- ***High yields of DNA-free total RNA***
- ***For accurate RT-PCR analysis***
- ***Effortless on-column DNA removal***

Don't let contaminated RNA samples cause misleading RT-PCR results!

The Absolutely RNA™ RT-PCR miniprep kit is the only kit specifically optimized for RT-PCR. The kit is ideal for purification of a wide range of samples from cultured cells or tissue, with effortless on-column DNA removal that creates pure RNA with no detectable DNA.

Each lot is tested in RT-PCR and QRT-PCR for performance and for absence of contaminating genomic DNA.

STRATAGENE USA and CANADA
ORDER: (800) 424-5444 x3
TECHNICAL SERVICES: 800-894-1304

STRATAGENE EUROPE
Belgium, Germany, The Netherlands, Switzerland, United Kingdom
European Toll-Free Numbers
ORDER: 00800 7000 7000
TECHNICAL SERVICES: 00800 7400 7400
Austria
0800 312 526
France
00800 7000 7000 or 0800-100391
INTERNET
eMAIL: techservices@stratagene.com
WEBSITE: www.stratagene.com

Absolutely RNA™
RT-PCR Miniprep Kit

For more information, please visit our website at
www.stratagene.com
Circle No. 45 on Readers' Service Card

Absolutely RNA™ RT-PCR Miniprep Kit
50 preps #400800

STRATAGENE®

VOLUME 290 20 OCTOBER 2000 NUMBER 5491

Science

www.sciencemag.org

COVER The 2001 AAAS Annual Meeting and Science Innovation Exposition will convene on 15 through 20 February in San Francisco. Under the theme of "Building the Future Through Science, Engineering, and Technology," seminars, symposia, exhibits, and lectures will examine emerging research and development in these three areas, as well as the implications for education, policy, and society. For expanded program details and reduced advance registration rates, see pages 541 to 558.

[PHOTOS: PHOTODISC; MOSQUITO, U.S. CENTERS FOR DISEASE CONTROL AND PREVENTION]

428
The world's most dangerous animal

DEPARTMENTS

NEWS

NEWS OF THE WEEK

NEWS FOCUS
MALARIA

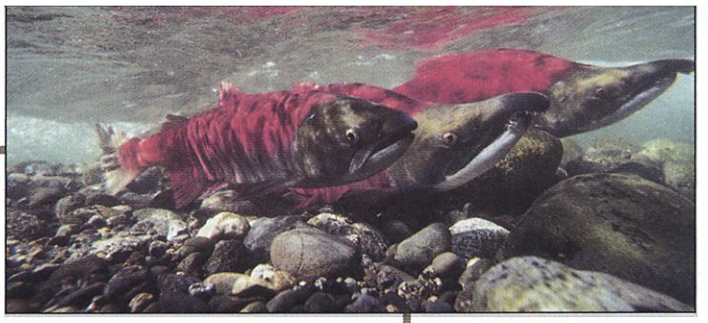
RESEARCH

RESEARCH ARTICLES

REPORTS

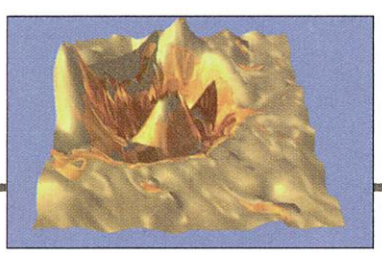
AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE

SCIENCE (ISSN 0036-8075) is published weekly on Friday, except the last week in December, by the American Association for the Advancement of Science, 1200 New York Avenue, NW, Washington, DC 20005. Periodicals Mail postage (publication No. 484460) paid at Washington, DC, and additional mailing offices. Copyright © 2000 by the American Association for the Advancement of Science. The title SCIENCE is a registered trademark of the AAAS. Domestic individual membership and subscription (51 issues): $112 ($62 allocated to subscription). Domestic institutional subscription (51 issues): $340; Foreign postage extra: Mexico, Caribbean (surface mail) $55; other countries (air assist delivery) $90. First class, airmail, student, and emeritus rates on request. Canadian rates with GST available upon request, GST #1254 88122. Publications Mail Agreement Number 1069624. **Printed in the U.S.A.**



462
Socking it to the competition

SCIENCE'S COMPASS



492
Capturing that magnetic moment

SCIENCE ONLINE
www.scienceonline.org

SCIENCE
THE JOURNAL
www.sciencemag.org

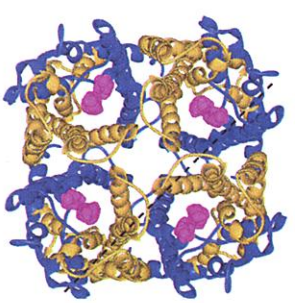
SCIENCENOW
DAILY NEWS SERVICE
www.sciencenow.org

NEXT WAVE
RESOURCES FOR YOUNG SCIENTISTS
www.nextwave.org

GRANTSNET
RESEARCH FUNDING DATABASE
www.grantsnet.org

NEUROAIDS
EXPERIMENTAL WEB SITE
www.sciencemag.org/NAIDS

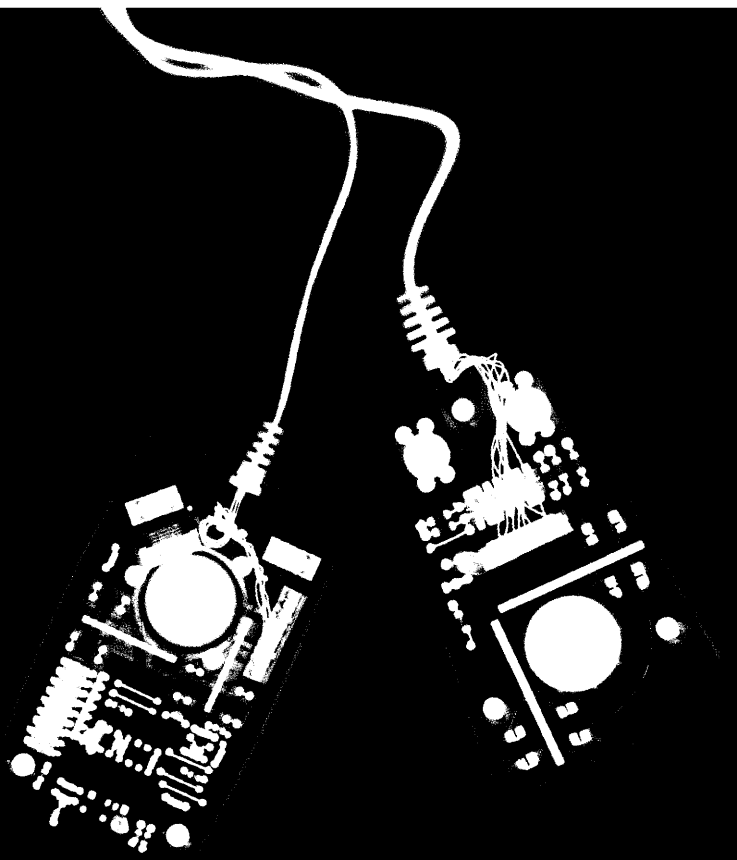
SCIENCE'S STKE
SIGNAL TRANSDUCTION KNOWLEDGE ENVIRONMENT
www.stke.org



481
Structure of a selective channel

Change of address: allow 4 weeks, giving old and new addresses and 8-digit account number. **Postmaster:** Send change of address to *Science*, P.O. Box 1811, Danbury, CT 06813–1811. **Single copy sales:** $8.00 per issue prepaid includes surface postage; bulk rates on request. **Authorization to photocopy** material for internal or personal use under circumstances not falling within the fair use provisions of the Copyright Act is granted by AAAS to libraries and other users registered with the Copyright Clearance Center (CCC) Transactional Reporting Service, provided that $8.00 per article is paid directly to CCC, 222 Rosewood Drive, Danvers, MA 01923. The identification code for *Science* is 0036-8075/83 $8.00. *Science* is indexed in the *Reader's Guide to Periodical Literature* and in several specialized indexes.

0002 dowcliffs.nhs.com



Wired Science

The power unleashed when science and technology are combined can result in tremendous improvements in scientific research. Amersham Pharmacia Biotech and SciQuest.com proudly announce a strategic alliance.

www.apbiotech.com and www.sciquest.com now united

Our alliance will help make studying life science easier, more efficient and productive. And offers you significant time savings by ensuring you can order, purchase and get full information about all Amersham Pharmacia Biotech products from one source: www.sciquest.com/apbiotech.

It's an alliance that gives you on-line access to the technical and applications support specialists from a leading biotech knowledge and solutions provider. Combined with fast and efficient on-line ordering and payment from a leading e-commerce provider in the life science industry.

Come discover how much time you can save on your next lab purchase. Go to www.sciquest.com/apbiotech. We're wired up and ready to serve you better.

SciQuest.com

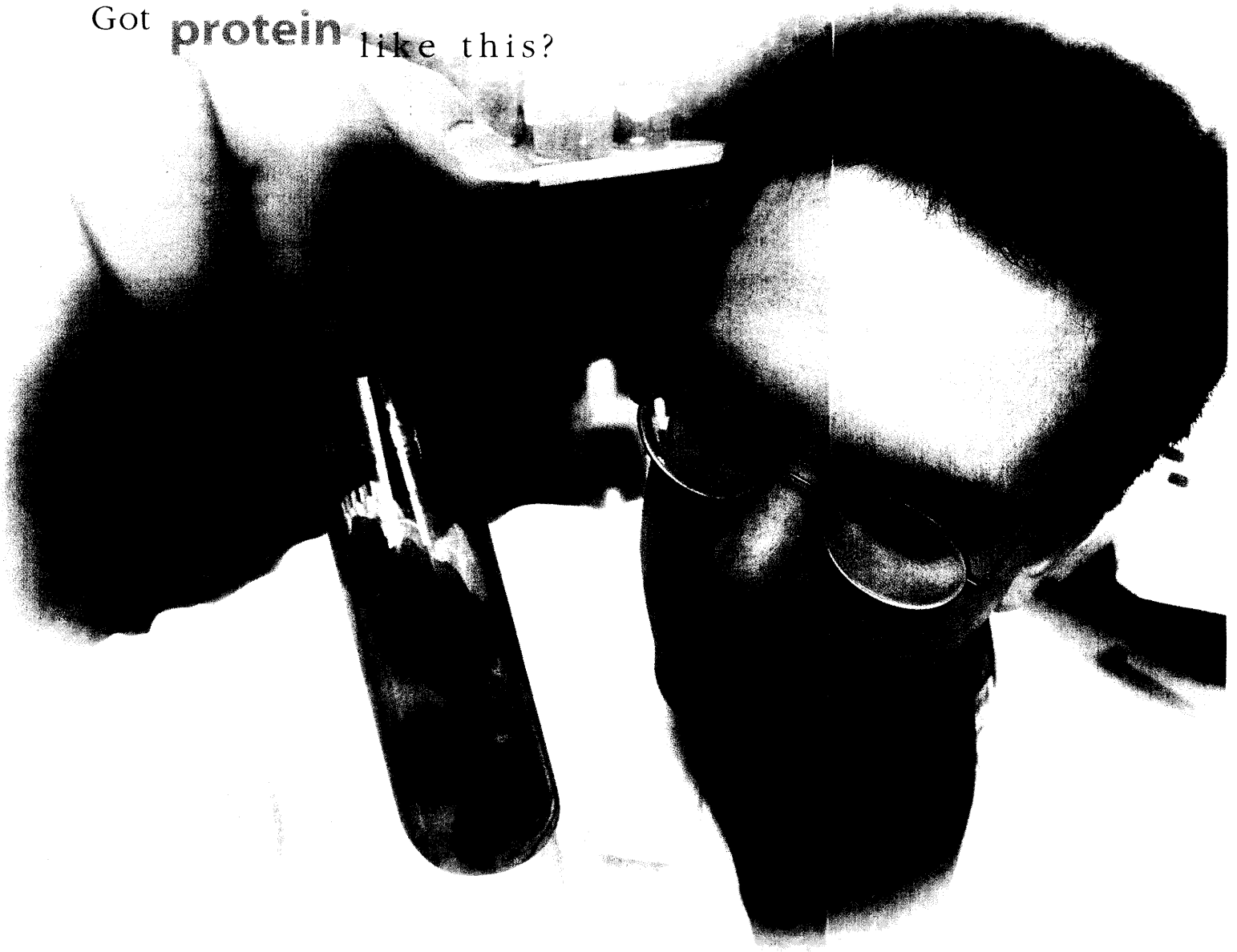
amersham pharmacia biotech

Amersham is a trademark of Nycomed Amersham plc. Pharmacia and Drop Design are trademarks of Pharmacia & Upjohn Inc.
SciQuest is a registered trademark of SciQuest.com, Inc.
Amersham Pharmacia Biotech UK Limited Amersham Place, Little Chalfont, Buckinghamshire, England HP7 9NA

Circle No. 78 on Readers' Service Card

ACTIVE SOLUBLE PROTEIN *from Novagen*

Got **protein** like this?



Fusion Tags
for enhancing target protein solubility

Host Strains
allowing disulfide bond formation

Solubilization & Refolding
of inclusion body proteins

Novagen...where you'll find the **best solutions**
for enhancing protein solubility in *E. coli*.

800.526.7319
Novagen
A Brand of CN Biosciences, Inc.
An affiliate of Merck KGaA, Darmstadt, Germany

Contact our Technical Service Scientists for more information and advice regarding **your** *protein.*

Circle No. 52 on Readers' Service Card

For more information: www.novagen.com • US and Canada 800.526.7319 • Germany 0800.6931.000 • UK 0800.622935 • or your local sales office

WATCHING THE MOMENT GO BY

A magnetic field exerts a torque on a magnetic moment that sends the corresponding spins into precessional motion. Although this effect of magnetic fields on magnetization is exploited in magnetic memory devices, the precise dynamics of the magnetization rotation are not clearly understood. Acremann *et al.* (p. 492; see the Perspective by Miltat and Thiaville) introduce a technique for taking three-dimensional submicrometer-sized snapshots of the magnetization vector with picosecond resolution to build a picture of the intricate motion that the magnetic moment undergoes when subjected to a magnetic field.

ROBUST COHERENCE

The viable development of quantum computers will depend on the implementation of procedures to overcome the problem of decoherence, where the superposition of the quantum states is lost due to disturbances from the environment. Recent theoretical work has suggested that the existence of decoherence-free subspaces can be created—a particular subset of quantum states can be chosen that will be robust to certain perturbations and not decohere. By subjecting the quantum system, in this case a pair of entangled photons, to collective decoherence, Kwiat *et al.* (p. 498) present experimental evidence for the existence of such decoherent-free states. The use of decoherence-free subspaces can help reduce the burden of quantum error-correction schemes in quantum information processing.

SILICON OVER CARBON IN A DOUBLES MATCH

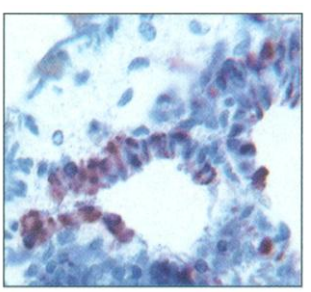
Carbon readily forms double bonds, but silicon double bonds can usually be stabilized only if they are protected with bulky constituents. Iwamoto *et al.* (p. 504) show that silicon double-bond chemistry can in some cases complement that of carbon. Although spiropentadiene, a double-ring carbon compound, has not yet been isolated, the authors show that the silicon analog is stable. Thus, silicon double-bond chemistry may not be as limited as previously assumed.

A STICKIER SILICON SURFACE

The adsorption of H_2 on the (100)-2 × 1 surface of silicon (which forms rows of tilted silicon dimers) is one of the best studied surface reactions, in part because of its technological importance, but also because of the puzzles it presents. Energetics suggests that there should be no significant barrier to adsorption, and that H_2 should stick readily at room temperature, but direct adsorption studies instead show a very low sticking coefficient ($<10^{-13}$) and a barrier of 0.7 electron volts. Buehler and Boland (p. 506) have prepared a bare surface in which the dimers are untilted and horizontal, and found that this preparation increased the sticking coefficient by a factor of 10^9. Moreover, the sticking coefficient did not change with temperature. These results suggest that finding an untilted dimer is the main barrier to adsorption, and that this surface may be a good model for the transition state for H_2 adsorption.

SACRIFICIAL CELLS

Induction of cell death is part and parcel of infection by most pathogenic viruses and bacteria. In some cases, the bacteria themselves can induce apoptotic cell death directly, although how this process influences the course of infection is not clear. Grassmé *et al.* (p. 527) offer strong evidence that it is imperative for host survival that certain types of cells should die in response to bacterial infection. *Pseudomonas aeruginosa*—a pulmonary bacterium responsible for pneumonia and sepsis in susceptible individuals—induces extensive apoptosis of lung epithelial cells. This cell death was in fact critical for the survival of mice that had been infected with the *P. aeruginosa* and depended on the interaction of the cell death receptor Fas (CD95) with its ligand. However, both Fas ligand as well as Fas had to be expressed on the epithelial cells, rather than on lymphocytes as would have been predicted.



TINY CLOUDS ON TITAN

Titan, a relatively large moon of Saturn, is dominated by a thick nitrogen-rich atmosphere. Why such a thick atmosphere should form on a small moon so far from the sun has been unclear. Griffith *et al.* (p. 509; see the Perspective by Lorenz) provide high-resolution near-infrared spectra of Titan which indicate the formation of small clouds on a daily basis. Titan may have weather patterns similar to Earth, with convection allowing the condensation of methane into clouds that quickly dissipate and that may shower rain toward Titan's deeply hidden surface.

IT'S SO EASY TO SLIP

Landslides have been increasingly recognized as critical in controlling the elevation and morphology of mountains. Not all landslides move catastrophically downhill—some creep or slide more slowly—and soil porosity may determine this marked difference. Iverson *et al.* (p. 513) examined landslide behavior in a series of experiments on a large flume where they could monitor dilation and contraction of soil. Small changes in soil porosity produced large changes in slip rate.

EXERTING CONTROL OVER HIV

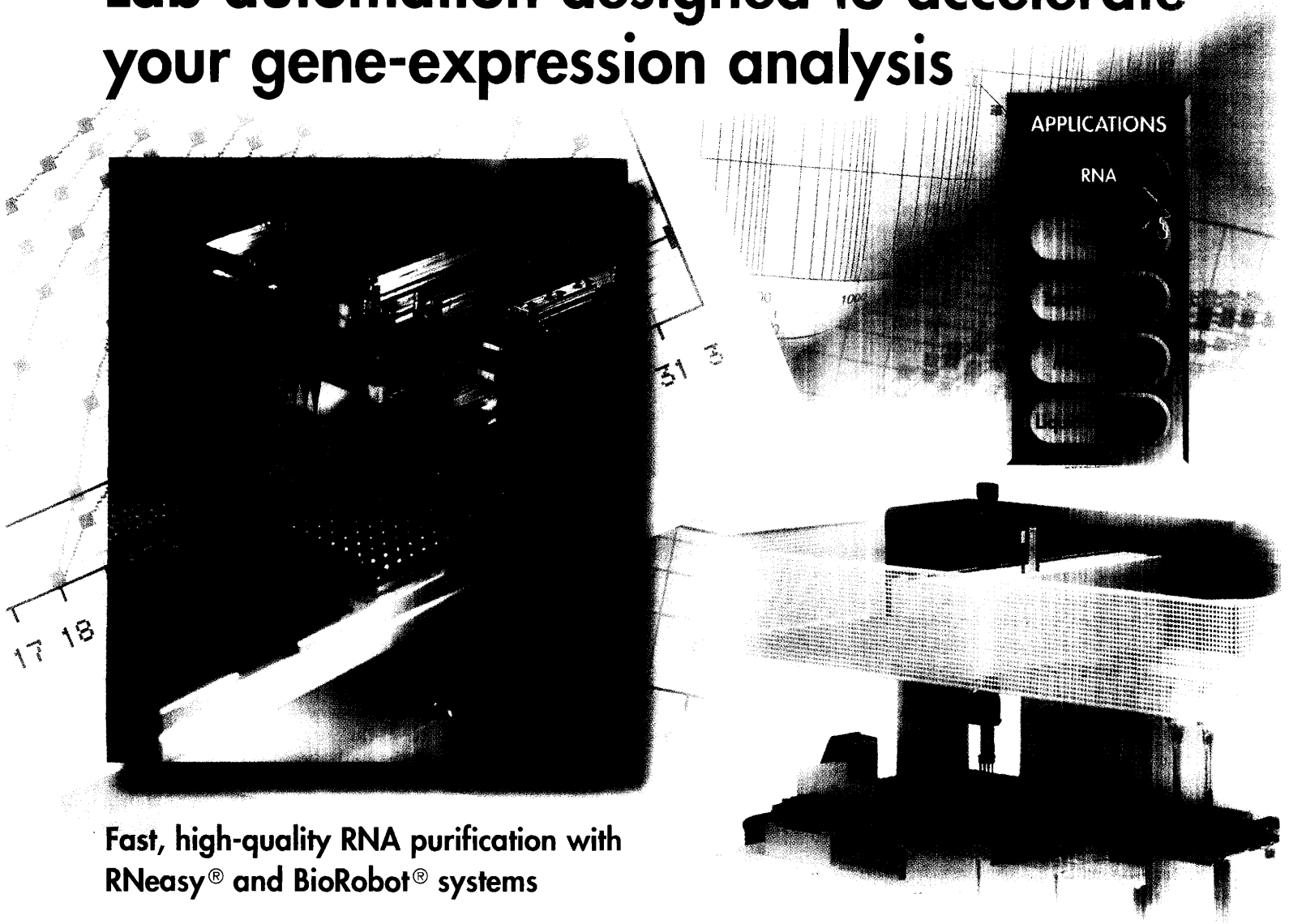
A vaccine response against human immunodeficiency virus (HIV) can be amplified so that it protects rhesus macaques from a pathogenic variety of the virus. Barouch *et al.* (p. 486; see the Perspective by Shen and Siliciano) administered a DNA vaccine containing the viral genes *gag* and *env* in the presence of a fusion protein of interleukin-2 and immunoglobulin. They observed a strong cytotoxic T lymphocyte response, low to undetectable virus levels, and no disease or death by 140 days after challenge with a chimeric simian-human form of the virus.

PICKY ABOUT A MATE

Direct experimental evidence that natural selection may reinforce mate recognition and help drive reproductive isolation (and ultimately speciation) in animal populations is the subject of two reports (see the Perspective by Barton). Higgie *et al.* (p. 519), using two species of Australian fruit fly that overlap in their geographical ranges, show that reproductive character displacement of pheromones in these natural populations of fruit flies is a consequence of natural selection on mate recognition. Hendry *et al.* (p. 516) report significant reproductive isolation after only 13 generations of divergent selection in sockeye salmon breeding in two very different habitats—streams and lake shores. This result indicates that divergent selection can precipitate reproductive isolation at a very early stage in an adaptive

CONTINUED ON PAGE 407

Lab automation designed to accelerate your gene-expression analysis



Fast, high-quality RNA purification with RNeasy® and BioRobot® systems

High-quality RNA

Use RNeasy® 96 technology for high-throughput RNA purification. RNA recoveries of more than 90% mean reliable results even from as few as 10 cells. Purified RNA is free from enzyme-inhibiting impurities for excellent performance in the most sensitive applications, including microarray and real-time RT-PCR (e.g., TaqMan® analysis).

Speed and reliability

BioRobot® systems automate your gene-expression projects, from cell lysis and RNA purification to high-throughput reaction setup. Up to 192 samples are simultaneously purified in 90 minutes. The accurate liquid-handling capabilities of the BioRobot systems ensure reproducible results, with overall CVs of less than 3% from RNA purification to final TaqMan results.

Comprehensive application support

Our Application Specialists have extensive experience in both molecular biology and instrumentation, and can offer help that goes beyond workstation design and installation. This unique support for application development and system expansion assures that your workstation meets your present and future needs.

Lab automation from QIAGEN — the company that understands molecular biology

Contact QIAGEN today!

Trademarks: BioRobot®, RNeasy® (QIAGEN); TaqMan® (Roche Molecular Systems, Inc.). QIAGEN robotic workstations are not available in all countries; please inquire.

© 2000 QIAGEN, all rights reserved

www.qiagen.com

Circle No. 53 on Readers' Service Card

QIAGEN:

Australia
Tel. 03-9489-3666
Fax 03-9489-3888

Canada
Tel. 800-572-9613
Fax 800-713-5951

France
Tel. 01-60-920-930
Fax 01-60-920-925

Germany
Tel. 02103-29-12400
Fax 02103-29-22022

Italy
Tel. 02-33-43-04-11
Fax 02-33-43-04-26

Japan
Tel. 03-5547-0811
Fax 03-5547-0818

Switzerland
Tel. 061-319-30-31
Fax 061-319-30-33

UK
Tel. 01293-422-999
Fax 01293-422-922

USA
Tel. 800-426-8157
Fax 800-718-2056

Distributors:

Argentina Tecnolab S.A. (011) 4555 0010 **Austria/Hungary/Slovenia** R. u. P. MARGARITELLA Austria (01) 889 18 19 **Belgium/Luxemburg** Westburg b.v. 0800-1-9815 **Brazil** Labtrade do Brazil (11) 543 1455 or 0800 55 1321 **Central & South America** Labtrade Inc. USA (305) 828-3818 **China** Gene Company Limited (852)2896-6283 **Cyprus** Scientronics Ltd (02) 765 416 **Czech Republic** BIO-CONSULT spol. s.r.o. (02)4447 1239 **Denmark** Merck Eurolab A/S 43 86 87 88 **Egypt** Clinilab 525 7212 **Finland** Merck Eurolab Oy (09)-804.551 **Greece** BioAnalytica S.A. (01)-640 03 18 **India** Genetix (011)-542 1714 or (011)-515 9346 **Israel** Westburg (Israel) Ltd. 07 66 50 814 or 1-800 20 22 20 **Korea** LRS Laboratories, Inc.(02) 924-86 97 **Malaysia** Research Biolabs Sdn. Bhd. (03)-7312099 **Mexico** Quimica Valaner S.A. de C.V.(5) 525 57 25 **The Netherlands** Westburg b.v. (033)-4950094 **New Zealand** Biolab Scientific Ltd. (09) 980 6700 or 0800 933 966 **Norway** Merck Eurolab AS 22 90 00 00 **Poland** Syngen Biotech Sp.z.o.o. (071) 351 41 06 or 0601 70 60 07 **Portugal** IZASA PORTUGAL, LDA (1)-424 73 64 **Singapore** Reseorch Biolabs Pte Ltd. 445 7927 **Slovak Republic** BIO-CONSULT Slovakia spol. s.r.o. (07) 50221 336 **South Africa** Southern Cross Biotechnology (Pty) Ltd (021) 671 5166 **Spain** IZASA, S.A. (93) 902.20.30.90 **Sweden** Merck Eurolab AB (08) 621 34 00 **Taiwan** TAIGEN Bioscience Corporation (02) 2880 2913 **Thailand** Theera Trading Co. Ltd. (02) 412-5672 **In other countries contact:** QIAGEN, Germany

QIAGEN

RXRN107/2000SWW

THIS WEEK IN *SCIENCE*

CONTINUED FROM PAGE 405

radiation and suggests that speciation might be amenable to experimental study in species with short generation times.

GUIDING GLYCEROL

Aquaporins are a family of membrane channel proteins that are selective for water or other small molecules, but exclude ions. The high sequence conservation throughout the aquaporin family is indicative of a common fold. Fu *et al* (p. 481) have now determined the structure of an aquaporin family member, *Escherichia coli* glycerol facilitator (GlpF), with three glycerol molecules in the channel, at 2.2 angstrom resolution. Glycerol molecules pass through a narrow "selectivity filter" and line up in single file in an amphipathic channel. The structure provides insight into why glycerol and linear carbohydrates can pass through the channel and exclude water and ions.

ROOT CAUSE OF AN INVASION

The invasive success of foreign plant species is often attributed to the lack of natural enemies in their new milieu. Callaway and Aschehoug (p. 521; see the news story by Jensen) show that *Centaurea diffusa*, a European plant that is highly competitive against grassland species in the western United States, is much less so against closely related grasses from its own native range. Experiments with activated charcoal and labeled phosphorus reveal strong interaction effects and suggest a role of root exudates in interspecific competition. These results have implications not only for understanding the processes by which species become invasive, but also for the evolution of plant communities in general.

SOMATIC MUTATIONS

Triplex-forming oligonucleotides (TFOs)—short, single-stranded segments of DNA that can bind to specific sites in double-stranded genomic DNA—can induce mutations at their binding sites. TFOs are potentially useful reagents for making mutations in somatic cells (all except the germ cells), but their utility has been limited by the inability to demonstrate their effectiveness in whole animals. Vasquez *et al.* (p. 530) now show that administering mice with intraperitoneal injections of a TFO (not chemically linked to mutagenic agents) is sufficient to increase the mutation rate at a specific marker site in the genome. Although the mechanism is not yet fully understood and the efficiency still low, the result provides proof-of-principal that somatic tissues can be targeted for mutagenesis by nucleic acids.

DIRECTLY CONNECTING LEARNING AND LTP

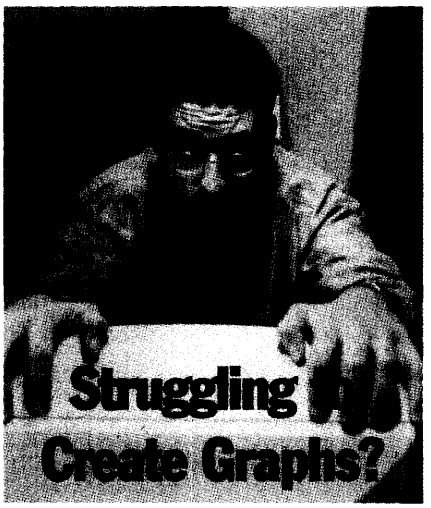
Learning a complex motor task in rats has now been shown to increase synaptic efficacy in motor cortex. Rioult-Pedotti *et al.* (p. 533) also found that this increase is accompanied by an occlusion in long-term potentiation (LTP) and a simultaneous increase in the capacity for long-term depression in the same synapses. Their findings indicate that the learning-produced synaptic potentiation reflects a shift in efficacy within the normal range for modifications of excitability. These data provide the strongest evidence to date that LTP and learning-related changes in synaptic efficacy share a common mechanism.

TECHNICAL COMMENT SUMMARIES

Indirect Aerosol Forcing

The full text of these comments can be seen at www.sciencemag.org/cgi/content/full/290/5491/407a

Crowley (Research Articles, 14 July, p. 270), comparing historical temperature reconstructions with predictions of an energy balance climate model, found that whereas natural forcing by variations in solar irradiance and volcanic emissions can explain most pre-1850 variability in Northern Hemisphere temperatures, trends in the last half of the 20th century cannot be accounted for without including the effects of anthropogenic greenhouse gases. In a comment, Penner and Rotstayn note that Crowley's calculations did not account for the indirect forcing effects of aerosols, an omission that, in the view of Penner and Rotstayn, "could lead to large systematic errors." Crowley responds that "not all studies...estimate as large an effect" from indirect aerosol forcing as do Penner and Rotstayn, and that if the forcing were as large as they maintain, late-20th-century warming could be simulated only by factoring in additional terms that provide positive feedbacks. "Although it is important to understand the role of indirect aerosol forcing," he argues, "the principle of parsimony" on which his study rests "still has merit in attempting to explain the temperature record of the last 1000 years."



GraphExpress offers painless graph creation for SAS® software users

Uniquely designed to integrate into your SAS® for Windows® environment, Graph Express provides a straightforward solution to graph creation. Simply point-and-click to add stunning graphs to your SAS output.

Create customized graphs in no time

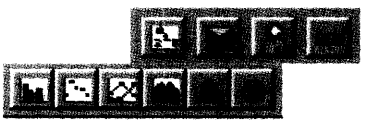
Choose from over 20 general toolbar buttons to call up an intuitive dialog box of plot options to define your graphs.

Instantly visualize your analyses

Click on toolbar buttons in your SAS environment to create diagnostic plots from GLM, correspondence analysis, factor analysis, discriminant analysis and more.

Produce graph templates in a flash

GraphExpress automatically generates the necessary syntax to add to your production jobs.



Call Today 1-800-345-4740

www.systat.com

graphexpress
Your SAS® Companion

Powered by SYSTAT

To order

Americas	+1.800.621.1393	sales@spss.com
Europe	+49.2104.9540	euroscience@spss.com
U.K	0800.894982	sales@clecom.co.uk
France	0800.90.37.55	euroscience@spss.com

Distributors Worldwide: www.spssscience.com/talk/

SAS and all other SAS Institute Inc. product or service names are registered trademarks or trademarks of SAS Institute Inc. in the USA and other countries. ® indicates USA registration

YGEAD-0900-SCI A4740

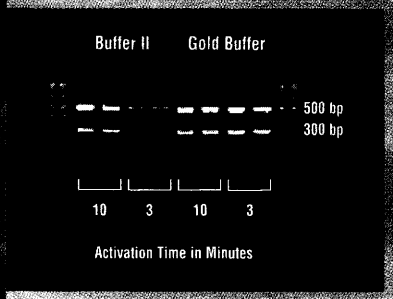
Circle No. 81 on Readers' Service Card

With roots this strong,

we can't help but grow.

Applied Biosystems roots go back to the origins of PCR. We were instrumental in its development and remain the world's leading source of innovative PCR technology, with a growing line of products known for performance and reliability. Products like the new GeneAmp® Gold PCR Reagent Kit.

Multiplex PCR in GeneAmp® PCR Gold Buffer vs. GeneAmp® PCR Buffer II



aMultiplex amplification of a 300 bp and a 500 bp product from 10^4 copies of λ DNA template in either GeneAmp PCR Gold Buffer or GeneAmp PCR Buffer II, with a 10 or 3 minute pre-PCR activation step at 95° C as indicated.

Self-contained and ready for amplification, the GeneAmp® Gold PCR Reagent Kit comes with AmpliTaq Gold® DNA Polymerase, our premium chemical Hot Start enzyme with Time Release capability, our new and improved Gold buffer, and dNTPs —and the confidence that comes from working with Applied Biosystems. Tap into our expertise. For more information on the GeneAmp Gold PCR Reagent Kit, contact your Applied Biosystems Representative, call 650.638.5800, or visit www.appliedbiosystems.com.

GeneAmp® Gold PCR Reagent Kit

PE Corporation is committed to providing the world's leading technology and information for life scientists.
PE Corporation consists of the Applied Biosystems and Celera Genomics businesses.

AmpliTaq Gold and GeneAmp are registered trademarks of Roche Molecular Systems, Inc. The PCR process is covered by patents owned by Roche Molecular Systems, Inc. and F. Hoffmann-La Roche Ltd. Certain Applied Biosystems reagents are developed and manufactured by Roche Molecular Systems, Inc. Applied Biosystems is a registered trademark of PE Corporation or its subsidiaries in the U.S. and certain other countries. For Research Use Only. Not for use in diagnostic procedures. ©2000 Applied Biosystems

Circle No. 41 on Readers' Service Card

Applied Biosystems

ORDER ON-LINE
store.appliedbiosystems.com

Clinging to an Old Screen?

PanVera's CoreHTS® High-Throughput Screening Assays can free you from older, more time-consuming methods. We're the industry leader in fluorescence polarization (FP) assays and protein production. Our FP-based assays include:

NEW!
- **Glucocorticoid Receptor Competitor Assay**
- **Protein Kinase C Assay (also detects PKA and GSK 3β)**
- **Protein Tyrosine Kinase Assay**
- **Estrogen Receptor α and β Competitor Assays**

Major pharmaceutical companies are screening with CoreHTS™ Assays because they are:

Easy: Homogeneous, solution-based

Rapid: Just mix and read

Robust: Quantitative and reproducible

Versatile: Formatted for HTS and uHTS

Stable: Allow batch processing of plates

Safe: Nonradioactive

CoreHTS

Assays you can bet your screen on.

For more information, call us, or see our website at **www.panvera.com**

PANVERA

The Protein Company™

Protein Kinase Assays have a patent pending. CoreHTS is a registered trademark and "The Protein Company" is a trademark of PanVera Corporation.

PanVera Corporation • 545 Science Dr., Madison WI 53711
Phone: 608.233.9450 • Fax: 608.233.3007
E-Mail: info@panvera.com

800.791.1400

In the USA and Canada

Circle No. 54 on Readers' Service Card

www.panvera.com

© 2000 PanVera Corporation. All rights reserved.

Lit.#L0188 Rev. 10/00

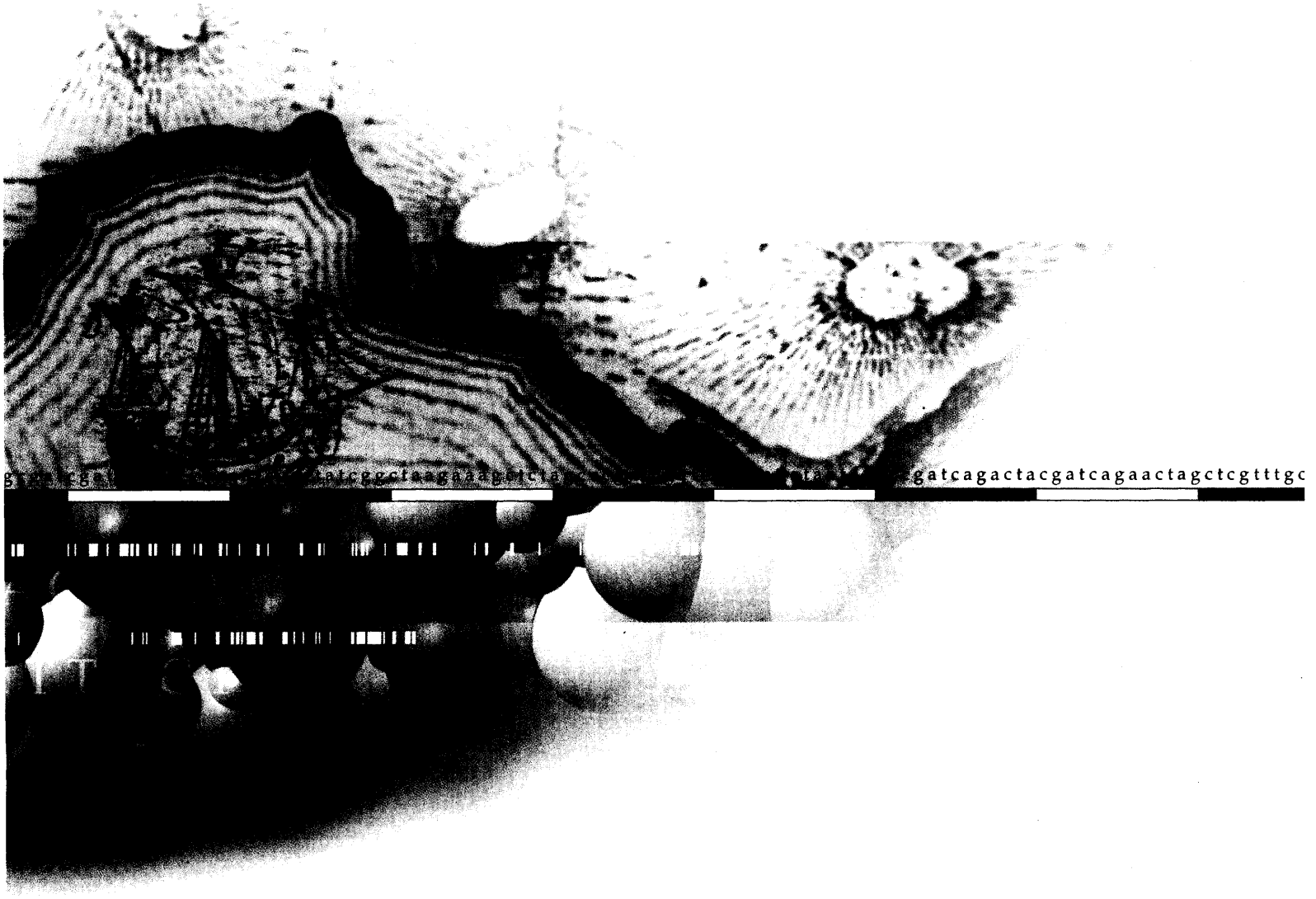
Unparalleled access to the genomics frontier

Integrated resources that help you navigate vast seas of data

DoubleTwist.com's secure, comprehensive research environment helps you chart your course for genomic exploration. By providing a single point of access to multiple public and proprietary databases (including the DoubleTwist Annotated Human Genome Database)—as well as a suite of automated research agents and sophisticated visualization tools—DoubleTwist.com guides you toward the answers you need.

© 2000 DoubleTwist, Inc.

Indispensable in uncharted territory



The affordable, unrestricted way to support your expedition

DoubleTwist's scalable, cost-effective, subscription-based solutions give any life scientist access to a powerful discovery platform. And because DoubleTwist is a neutral service provider, we do not assume any rights to your discoveries or developments made from these discoveries. Whether you're searching for homologues or potential full-length cDNAs, on the lookout for new gene family members or alternative splice forms, there's no better compass for navigating the genomics frontier than DoubleTwist.com.

Register today at www.DoubleTwist.com—
and launch *your* genomics discovery mission.

DoubleTwist.com
Portal to the Code™

Circle No. 15 on Readers' Service Card

Science

www.sciencemag.org

1200 New York Avenue, NW
Washington, DC 20005
Editorial: 202-326-6550, FAX 202-289-7562
News: 202-326-6500, FAX 202-371-9227
Permissions: 202-326-7074, FAX 202-682-0816
Subscriptions: 800-731-4939 or 202-326-6417, FAX 202-842-1065

Bateman House, 82-88 Hills Road
Cambridge, UK CB2 1LQ
(44) 1223-326500, FAX (44) 1223-326501

EDITOR-IN-CHIEF **Donald Kennedy**
EDITOR **Ellis Rubinstein**
MANAGING EDITOR **Monica M. Bradford**

DEPUTY MANAGING EDITORS R. Brooks Hanson, Katrina L. Kelner
NEWS EDITOR Colin Norman

EDITORIAL/COMPASS SUPERVISORY SENIOR EDITORS Barbara Jasny, Guy Riddihough, Phillip D. Szuromi; SENIOR EDITOR/PERSPECTIVES Orla Smith; SENIOR EDITORS Gilbert J. Chin, Pamela J. Hines, Paula A. Kiberstis (Boston), L. Bryan Ray, Linda R. Rowan; ASSOCIATE EDITORS Lisa D. Chong, Beverly A. Purnell, H. Jesse Smith, Valda Vinson; ASSOCIATE BOOK REVIEW EDITOR Sherman J. Suter; ASSOCIATE LETTERS EDITOR Christine M. Pearce; ASSOCIATE TC/WEB EDITOR Stewart Wills; INFORMATION SPECIALIST Janet Kegg; CONTRIBUTING EDITOR Kevin Ahern; EDITORIAL MANAGER Cara Tate; SENIOR COPY EDITORS Harry Jach, Etta Kavanagh, Barbara P. Ordway, COPY EDITORS Jeffrey E. Cook, Jason Llewellyn, Joshua Marcy, Monique Martineau; EDITORIAL COORDINATORS Carolyn Kyle, Ellen E. Murphy, Beverly Shields; PUBLICATIONS ASSISTANTS Chris Filiatreau, Joi S. Granger, Jeffrey Hearn, Charlene King; Gail Murphy, Anita Wynn; EDITORIAL ASSISTANTS Elise Laffman, Kathy Libal; EDITORIAL SUPPORT ASSISTANTS Osa Atoe, Christopher Kenny, Patricia M. Moore, Brian White, Karen Yuan; EXECUTIVE ASSISTANT Sylvia S. Kihara; ADMINISTRATIVE SUPPORT Patricia F. Fisher

science_editors@aaas.org (for general editorial queries)
science_letters@aaas.org (for letters to the editor)
science_reviews@aaas.org (for returning manuscript reviews)
science_ bookrevs@aaas.org (for book review queries)

NEWS SENIOR CORRESPONDENTS Eliot Marshall, Jean Marx; DEPUTY NEWS EDITORS Robert Coontz, Jeffrey Mervis, Leslie Roberts; CONTRIBUTING EDITORS Elizabeth Culotta, Polly Shulman; NEWS WRITERS Martin Enserink, Laura Helmuth, Constance Holden, Jocelyn Kaiser, Richard A. Kerr, Andrew Lawler (Boston), David Malakoff, Elizabeth Pennisi, Charles Seife, Robert F. Service (Pacific NW), Gretchen Vogel, John MacNeil (intern); PATHWAYS OF DISCOVERY EDITOR Ivan Amato; CONTRIBUTING CORRESPONDENTS Marcia Barinaga (Berkeley, CA), Barry A. Cipra, Jon Cohen (San Diego, CA), Daniel Ferber, Ann Gibbons, Robert Irion, Charles C. Mann, Anne Simon Moffat, Virginia Morell, Evelyn Strauss, Gary Taubes, Ingrid Wickelgren; COPY EDITORS Linda B. Felaco, Daniel T. Helgerman; ADMINISTRATIVE SUPPORT Scherraine Mack, Fannie Groom; BUREAUS: Berkeley, CA: 510-652-0302, FAX 510-652-1867, Boston, MA: 617-542-5098, San Diego, CA: 760-942-3252, FAX 760-942-4979, Pacific Northwest: 541-342-6290

PRODUCTION DIRECTOR James Landry; MANAGER Wendy K. Shank; ASSISTANT PRODUCTION MANAGER Rob Masson; ASSOCIATES Rebecca Doshi, Vicki J. Jorgensen, Tara L. Kelly, Jessica K. Moshell

ART DESIGN DIRECTOR C. Faber Smith; ART DIRECTOR Alan T. Stonebraker; ASSOCIATE ART DIRECTOR Stephanie D. Halvorson; ILLUSTRATOR Katharine Sutliff; ASSOCIATES Holly Bishop, Joshua Moglia, Debra J. Morgenegg, Preston Morrighan; PHOTO RESEARCHER Leslie Blizard

***SCIENCE* INTERNATIONAL**

EUROPE (science@science-int.co.uk) EDITORIAL: SUPERVISORY SENIOR EDITOR Andrew M. Sugden; SENIOR EDITOR/PERSPECTIVES Julia Uppenbrink; ASSOCIATE EDITORS Caroline Ash, Stella M. Hurtley, Ian S. Osborne, Stephen J. Simpson, Peter Stern; EDITORIAL SUPPORT Jenny Parker; ADMINISTRATIVE SUPPORT Janet Mumford, Liz Ellis; NEWS: EUROPEAN NEWS EDITOR Richard Stone, CORRESPONDENT Michael Balter (Paris: (33) 1-49-29-09-01, FAX (33) 1-49-29-09-00); CONTRIBUTING CORRESPONDENT Robert Koenig (Bern)

ASIA Japan Office: Asca Corporation, Eiko Ishioka, Fusako Tamura, 1-8-13, Hirano-cho, Chuo-ku, Osaka-shi, Osaka, 541-0046 Japan; (81) 6-6202-6272, FAX (81) 6-6202-6271; asca@os.gulf.or.jp JAPAN NEWS BUREAU: Dennis Normile (contributing correspondent, (81) 3-3335-9925, FAX (81) 3-3335-4898; dnormile@twics.com); CHINA REPRESENTATIVE Hao Xin, (86) 10-6255-9478; science@public3.bta.net.cn; INDIA Pallava Bagla (contributing correspondent (91) 11-271-2896; pbagla@ndb.vsnl.net.in)

***SCIENCE*NOW** (www.sciencenow.org) EDITOR Erik Stokstad

***SCIENCE*'S NEXT WAVE** (www.nextwave.org) EDITORIAL: MANAGING EDITOR Crispin Taylor; EDITORS Robert Metzke (Germany), Kirstie Urquhart (UK); CONTRIBUTING EDITORS Charles Boulakia (Canada), Mark Sincell; PROJECT EDITOR Vid Mohan-Ram; WRITER Katie Farr; PROJECT MANAGER Emily Klotz; MARKETING: MARKETING MANAGERS Karen Horting (US and Canada), Hazel Crocker (Europe); PROGRAM DIRECTOR Lisa Kozlowski; MARKETING ASSOCIATE Joey D'Adamo

PUBLISHER **Richard S. Nicholson**
ASSOCIATE PUBLISHER **Beth Rosner**
MEMBERSHIP/CIRCULATION DIR. **Michael Spinella**

MEMBERSHIP/CIRCULATION (membership@aaas.org) DEPUTY DIRECTOR Marlene Zendell; MEMBER SERVICES: MANAGER Michael Lung; SUPERVISOR Mary Curry; COORDINATOR Jantell Stone; SENIOR REPRESENTATIVES Laurie Baker, Pat Butler; REPRESENTATIVES Elizabeth Early, Katrina Smith; MARKETING: MANAGER Scott Oser; ASSOCIATES Lauri Sirois, Deborah Stromberg; EUROPE SENIOR EXECUTIVE Ruth Jackson; EXECUTIVE Martin Paine; RESEARCH: MANAGER Renuka Chander; BUSINESS AND FINANCE: MANAGER Teressa Ellis; ADMINISTRATIVE SUPPORT Zadia McKinnon; COMPUTER SPECIALIST Charles Munson

SUBSCRIPTION SERVICES For change of address, missing issues, new orders and renewals, and payment questions: 800-731-4939 or 202-326-6417, FAX 202-842-1065. Mailing addresses: AAAS, P.O. Box 1811, Danbury, CT 06813 or AAAS Member Services, 1200 New York Avenue, NW, Washington, DC 20005

REPRINTS Ordering/Billing/Status 800-407-9190; Corrections 202-326-6501

MEMBER BENEFITS For Credit Card: MBNA 1-800-847-7378; Car Rentals: Hertz 1-800-654-2200 CDP#343457, Dollar 1-800-800-4000 #AA1115; AAAS Travels: Betchart Expeditions 1-800-252-4910; Life Insurance: Seabury & Smith 1-800-424-9883; Other Benefits: AAAS Member Services 1-202-326-6417.

FINANCE AND ADVERTISING BUSINESS MANAGER Deborah Rivera-Wienhold; SENIOR ANALYST Randy Yi; FINANCIAL ANALYSTS Lisa Donovan, Jessica Tierney; RIGHTS AND PERMISSIONS: ASSOCIATE Emilie David; ASSISTANT Karen Lentz

MARKETING: DIRECTOR John Meyers; ASSOCIATES Mary Ellen Crowley, Amanda Donathen, Allison Pritchard ELECTRONIC MEDIA: MANAGER David Gillikin; ASSISTANT PRODUCTION MANAGER Wendy Green; SENIOR PRODUCTION ASSOCIATE Lisa Stanford; PRODUCTION ASSOCIATES Carla Cathey, Mark Croatti, Robert Owens, Louis Williams ADMINISTRATIVE SUPPORT Joyce Scott

PRODUCT ADVERTISING (science_ advertising@aaas.org) NATIONAL SALES MANAGER Richard Teeling: 973-694-9173, FAX 973-694-9193 • NORTHEAST AND E. CANADA Elizabeth Pointek: 973-969-1542, FAX 202-682-1816 • MIDWEST Rick Bongiovanni: 330-405-7080, FAX 330-405-7081 • WEST COAST/W. CANADA Neil Boylan: 415-673-9265, FAX 415-673-9267 • MID-ATLANTIC AND U.S. INSIDE SALES Christopher Breslin: 443-512-0330, FAX 443-512-0331 NEW MEDIA SALES MANAGER Chris Peterson: 410-560-3960, FAX 410 560-3961 • UK/SCANDINAVIA/FRANCE/ITALY/BELGIUM/NETHERLANDS Andrew Davies: (44) 7-071-226-216, FAX (44) 7-071-226-233 • GERMANY/SWITZERLAND/AUSTRIA Tracey Peers: (44) 1-260-297-530, FAX (44) 1-260-271-022 JAPAN Mashy Yoshikawa: (81) 3-3235-5961, FAX (81) 3-3235-5852 • TRAFFIC MANAGER Carol Maddox; TRAFFIC ASSOCIATE Halimah S. Whitby; SENIOR SALES ASSOCIATE Sheila Myers

RECRUITMENT ADVERTISING (science_classifieds@aaas.org); PRODUCTION MANAGER Jennifer Rankin U.S.: SALES MANAGER Gabrielle Boguslawski: 718-491-1607, FAX 202-289-6742; WEST COAST SALES MANAGER Kristine von Zedlitz; EAST COAST SALES MANAGER Jill Steinberg; INTERNET SALES MANAGER Beth Dwyer; ASSISTANT SALES MANAGER Daryl Anderson; SENIOR SALES COORDINATOR Erika Bryant; SALES COORDINATORS Rohan Edmonson, Caroline Gallina, Shirley Young; SALES REPRESENTATIVES Kathleen Clark, Jody Fenty, Christina Geiger, Bren Peters-Minnis; ASSISTANTS Sussy Castilla, Emnet Tesfaye; ASSOCIATES Christine Borkowski, Dawn Bruno, Chris Scarince; PUBLICATIONS ASSISTANTS Robert Buck, Jane Vaughn; U.K./EUROPE: SALES MANAGER Debbie Cummings; PROMOTIONS COORDINATOR Richard Walters; INTERNET SALES EXECUTIVE Tracy Holmes; SALES EXECUTIVE Bonnie Price Lofton; AUSTRALIA/NEW ZEALAND: Keith Sandell: (61) 02-9922-2977, FAX (61) 02-9922-1100 JAPAN: Mashy Yoshikawa: (81) 3-3235-5961, FAX (81) 3-3235-5852

AAAS BOARD OF DIRECTORS RETIRING PRESIDENT, CHAIR Stephen Jay Gould; PRESIDENT Mary Lowe Good; PRESIDENT-ELECT Peter H. Raven; TREASURER David E. Shaw; EXECUTIVE OFFICER Richard S. Nicholson; BOARD Lewis M. Branscomb; Nina V. Fedoroff; Robert D. Goldman; Alice S. Huang; Sally Gregory Kohlstedt; Richard A. Meserve; Robert C. Richardson; Neena B. Schwartz

Published by the American Association for the Advancement of Science (AAAS), *Science* serves its readers as a forum for the presentation and discussion of important issues related to the advancement of science, including the presentation of minority or conflicting points of view, rather than by publishing only material on which a consensus has been reached. Accordingly, all articles published in *Science*—including editorials, news and comment, and book reviews—are signed and reflect the individual views of the authors and not official points of view adopted by the AAAS or the institutions with which the authors are affiliated.

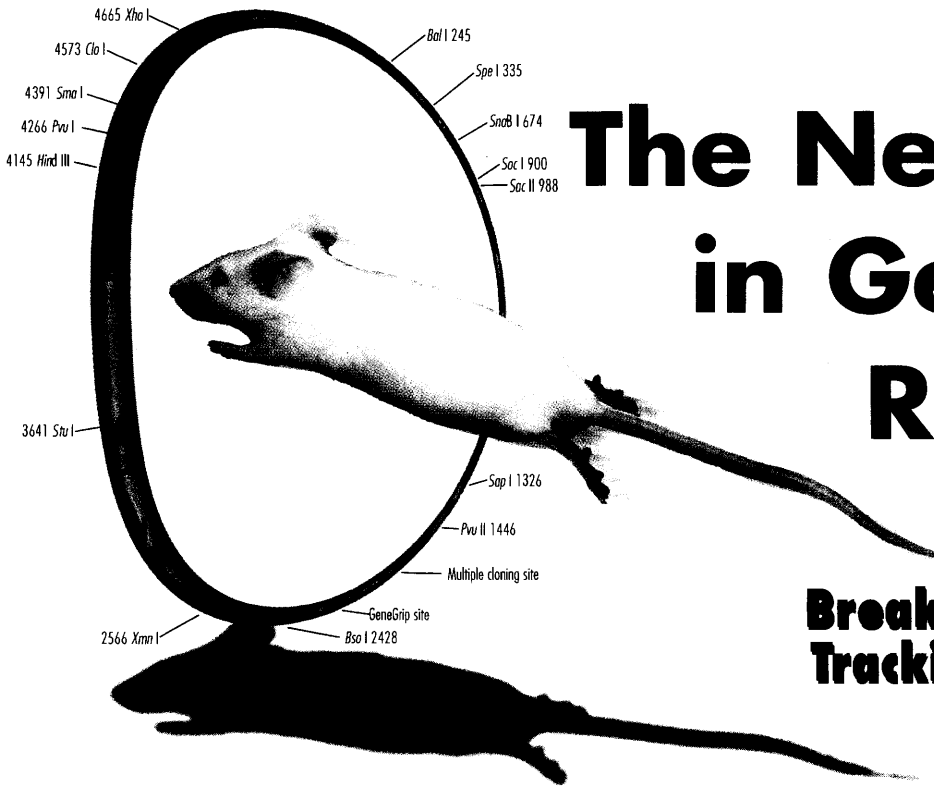
The American Association for the Advancement of Science was founded in 1848 and incorporated in 1874. Its objectives are to further the work of scientists, to facilitate cooperation among them, to foster scientific freedom and responsibility, to improve the effectiveness of science in the promotion of human welfare, to advance education in science, and to increase public understanding and appreciation of the importance and promise of the methods of science in human progress.

INFORMATION FOR CONTRIBUTORS
See pages 147 and 148 of the 7 January 2000 issue or access www.sciencemag.org/misc/con-info.shtml

DEPUTY EDITORS: Philip H. Abelson *(Engineering and Applied Sciences)*; John I. Brauman *(Physical Sciences)*

BOARD OF REVIEWING EDITORS

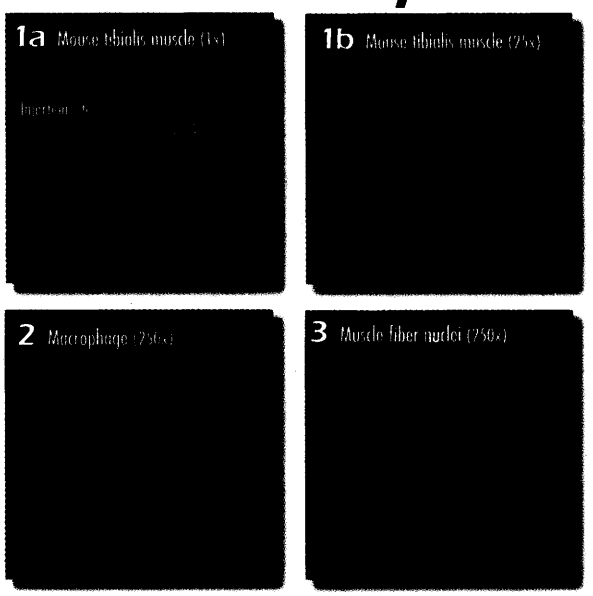
Frederick W. Alt *Children's Hospital, Boston*
Edouard Bard *Univ. d'Aix-Marseille III*
Frank S. Bates *Univ. of Minnesota*
Ray H. Baughman *Honeywell International*
Stephen J. Benkovic *Pennsylvania State Univ.*
Michael J. Bevan *Univ. of Washington*
Seth S. Blair *Univ. of Wisconsin*
Mark Boguski *NCBI, NIH*
Henry R. Bourne *Univ. of California, San Francisco*
James J. Bull *Univ. of Texas at Austin*
Joseph A. Burns *Cornell Univ.*
Kathryn Calame *Columbia Univ. College of Physicians and Surgeons*
Dennis W. Choi *Washington Univ. School of Medicine, St. Louis*
Joanne Chory *The Salk Institute*
David Clapham *Children's Hospital, Boston*
Jonathan D. Cohen *Princeton Univ.*
Daniel G. Colley *Centers for Disease Control*
F. Fleming Crim *Univ. of Wisconsin*
James E. Dahlberg *Univ. of Wisconsin Medical School*
Robert Desimone *NIMH. NIH*
Hans Eklund *Swedish Univ. of Agricultural Sciences*
Gerhard Ertl *Fritz-Haber-Institut, Berlin*
Paul G. Falkowski *Rutgers Univ.*
Gary Felsenfeld *NIDDKD, NIH*
Douglas T. Fearon *Univ. of Cambridge*
Jeffrey S. Flier *Harvard Medical School*
Richard Fortey *The Natural History Museum, London*
Harry A. Fozzard *Univ. of Chicago*
Chris D. Frith *Univ. College London*
James Gimzewski *IBM Research, Ruschlikon, Switzerland*
Jack F. Greenblatt *Univ. of Toronto*
Philip C. Hanawalt *Stanford Univ.*
Paul Harvey *Univ. of Oxford*
Michael P. Hassell *Imperial College at Silwood Park*
Martin Heimann *Max-Planck-Institute for Biogeochemistry, Jena*
Tasuku Honjo *Kyoto Univ.*
Evelyn L. Hu *Univ. of California, Santa Barbara*
Eric F. Johnson *The Scripps Res. Inst.*
Hans Kende *Michigan State Univ.*
Marc Kirschner *Harvard Medical School*
Elliott Kieff *Harvard Medical School*
Christian Körner *Botanisches Institut, Basel*
Anne Krueger *Stanford Univ.*
Michael LaBarbera *Univ. of Chicago*
Antonio Lanzavecchia *Inst. of Res. in Biomedicine, Bellinzona, Switzerland*
Anthony J. Leggett *Univ. of Illinois, Urbana-Champaign*
Norman L. Letvin *Beth Israel Deaconess Medical Center, Boston*
Richard Losick *Harvard Univ.*
Susan K. McConnell *Stanford Univ.*
Raul Madariaga *École Normale Supérieure, Paris*
George M. Martin *Univ. of Washington*
Diane Mathis *Harvard Medical School*
Anthony R. Means *Duke Univ. Medical Center*
Douglas A. Melton *Harvard Univ.*
Andrew Murray *Univ. of California, San Francisco*
Elizabeth G. Nabel *NHLBI, NIH*
Shigekazu Nagata *Osaka Univ. Medical School*
Roger Nicoll *Univ. of California, San Francisco*
Staffan Normark *Swedish Institute for Infectious Disease Control*
Michele Parrinello *Max-Planck-Inst. for Solid State Research, Stuttgart*
Suzanne Pfeffer *Stanford Univ. School of Medicine*
Stuart L. Pimm *Columbia Univ.*
David C. Rubie *Universität Bayreuth*
Erkki Ruoslahti *The Burnham Institute*
Ronald H. Schwartz *NIAID, NIH*
Terrence J. Sejnowski *The Salk Institute*
Manfred Sigrist *Kyoto Univ.*
Susan Solomon *National Oceanic and Atmospheric Adm.*
Christopher R. Somerville *Carnegie Institute of Washington, Stanford*
Will J. Stewart *Marconi Caswell, Towcester*
Cliff Tabin *Harvard Medical School*
Tomoyuki Takahashi *Univ. of Tokyo*
Yoshinori Tokura *Univ. of Tokyo*
Joan S. Valentine *Univ. of California, Los Angeles*
Michiel van der Klis *Astronomical Inst. of Amsterdam*
Derek van der Kooy *Univ. of Toronto*
Bert Vogelstein *Johns Hopkins*
Arthur Weiss *Univ. of California, San Francisco*
Zena Werb *Univ. of California, San Francisco*
George M. Whitesides *Harvard Univ.*
Ian A. Wilson *The Scripps Res. Inst.*
Martin Zatz *NIMH, NIH*
Walter Zieglgänsberger *Max-Planck-Institute of Psychiatry, Munich*
Maria Zuber *Massachusetts Inst. of Technology*



The Next Leap in Genomics Research

Breakthrough Tools for Tracking Gene Delivery

Track Gene Delivery In Vivo



Rhodamine-labeled GeneGrip™ plasmid was used to follow the distribution of DNA after injection into mouse tibialis muscle. Figure 1a: Plasmid distributed through the entire injected muscle, 5 minutes post-injection (1x). Figure 1b: Plasmid localized between muscle fibers, 5 minutes post-injection (25x). Figure 2: Uptake of plasmid into the endosomal compartment of resident macrophage (250x). YO-PRO-1 green stain[1] was used to label nuclei. Figure 3: Plasmid localized in nuclei of muscle fibers (250x). Yellow areas indicate localization of rhodamine-labeled DNA in YO-PRO-1–stained nuclei.

[1]Dupuis, M., et al., *J. Immunol.* 2000, 165:2850–2858.

Images used with permission of the American Association of Immunologists, ©2000

Introducing

PNA-Dependent Gene Chemistry

What can you do with it?

- ✔ Attach peptides, proteins, and fluorescent labels to plasmids
- ✔ Find and track genes in vivo or in vitro
- ✔ Identify and overcome barriers in gene delivery

Take the next leap in genomic research by visually following DNA delivery with Gene Therapy System's GeneGrip™ plasmid technology.* Identify delivery problems in vivo or in vitro by adding fluorescent molecules for tracking. Attach peptides, proteins, or other molecules to plasmids for cell-specific targeting, membrane transport, endosomal escape, nuclear localization, and transcription activation. For a list of innovative delivery and gene chemistry tools, visit our web site at www.genetherapysystems.com.

*Patents Pending

Order: 888-428-0558
Fax: 858-623-9494
10190 Telesis Court, San Diego, CA 92121, USA
For more information visit the
Gene Therapy Systems web site @
http://www.genetherapysystems.com

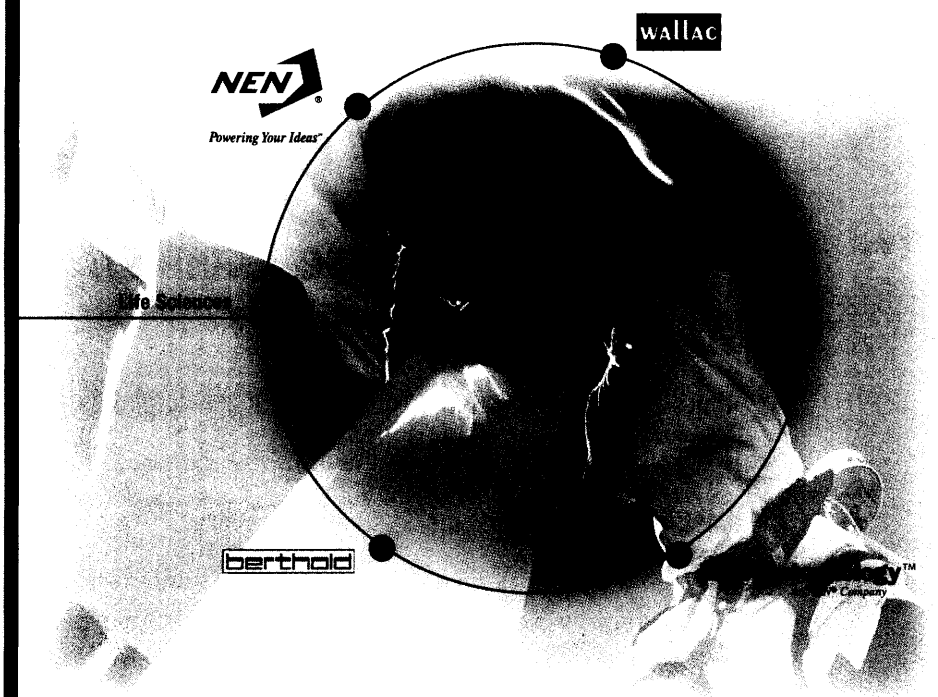
Gene Therapy Systems
"innovations in gene therapy"

Life Sciences

Drug Discovery | Research | Genetic Screening

PerkinElmer Life Sciences and NEN working together?

precisely.



Measured Success
PerkinElmer and NEN are a perfect team. A combination so complementary it just had to happen. The premier life sciences brand in reagent systems joins the leader in biomedical, drug discovery and research instrumentation. Together, providing complete assay and research solutions to life science researchers everywhere.

Here's what this means to you:

The New PerkinElmer

- A complete line of instrumentation for liquid scintillation, fluorescence and luminescence detection, plus over 2,000 reagents and consumables.
- Leading-edge solutions in emerging fields such as functional genomics, biochips, SNPs, live cell imaging and "next generation" detection reagents.
- Complete assay development and instrumentation systems for high throughput screening and other areas involved in target validation for drug discovery.
- Optimized solutions through increased sales and technical support worldwide.

Learn more about the new PerkinElmer Life Sciences.
www.perkinelmer.com/lifesciences

About PerkinElmer Life Sciences

Drug Discovery
Comprehensive set of tools, services, reagents and consumables for innovative research.

Genetic Screening
Complete screening systems for neonatal, prenatal, infertility, thyroid and oncology disorders.

Research
Quality solutions, reliable services in functional genomics, proteomics and cellomics.

PerkinElmer™
life sciences.

World Headquarters: PerkinElmer Life Sciences, 549 Albany Street, Boston, MA 02118-2512 USA (800) 551-2121
PerkinElmer Life Sciences, B-1930 Zaventem Belgium, +32 2 717 7924 • Turku, Finland, PO Box 10, FIN-20101, +358 2 2678 111

www.perkinelmer.com

Circle No. 47 on Readers' Service Card

You Really are Seeing Double...

Mini-Prep 24

FOR FULLY AUTOMATED PLASMID MINI-PREPS

Introducing the new short body cassettes that give you twice the yield... at no extra cost.

The Mini-Prep 24 uses a revolutionary new method of plasmid purification based on agarose gel electrophoresis and subsequent recovery by electroelution...all done automatically!

High Purity - for fluorescent and manual sequencing
Easy Operation - begin prep with direct loading of 2 mls bacteria culture
Consistent Results - up to 6 µg of plasmid per lane
Fast - up to 24 preps per hour
Affordable - list price under $8100

NO CENTRIFUGATION STEPS

Now with Twice the Yield *Call to learn how the Mini-Prep 24 can have you seeing double the yield of plasmid DNA.*

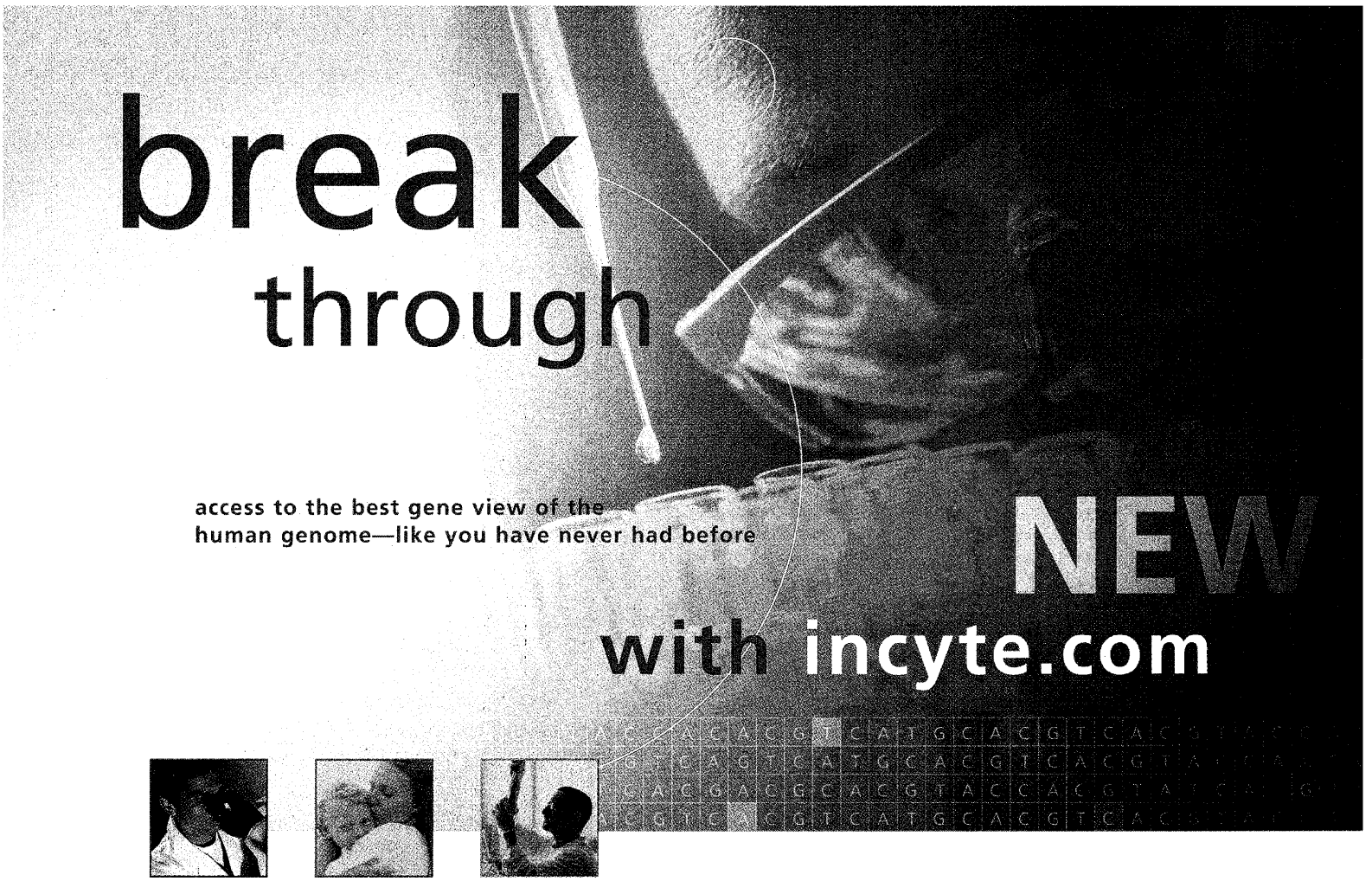
MACCONNELL RESEARCH

1-800-466-7949

6195 Cornerstone Court • San Diego, CA 92121 *Phone: (858) 452-2603* *Fax (858) 452-6753*

www.macconnell.com

Circle No. 29 on Readers' Service Card



www.incyte.com

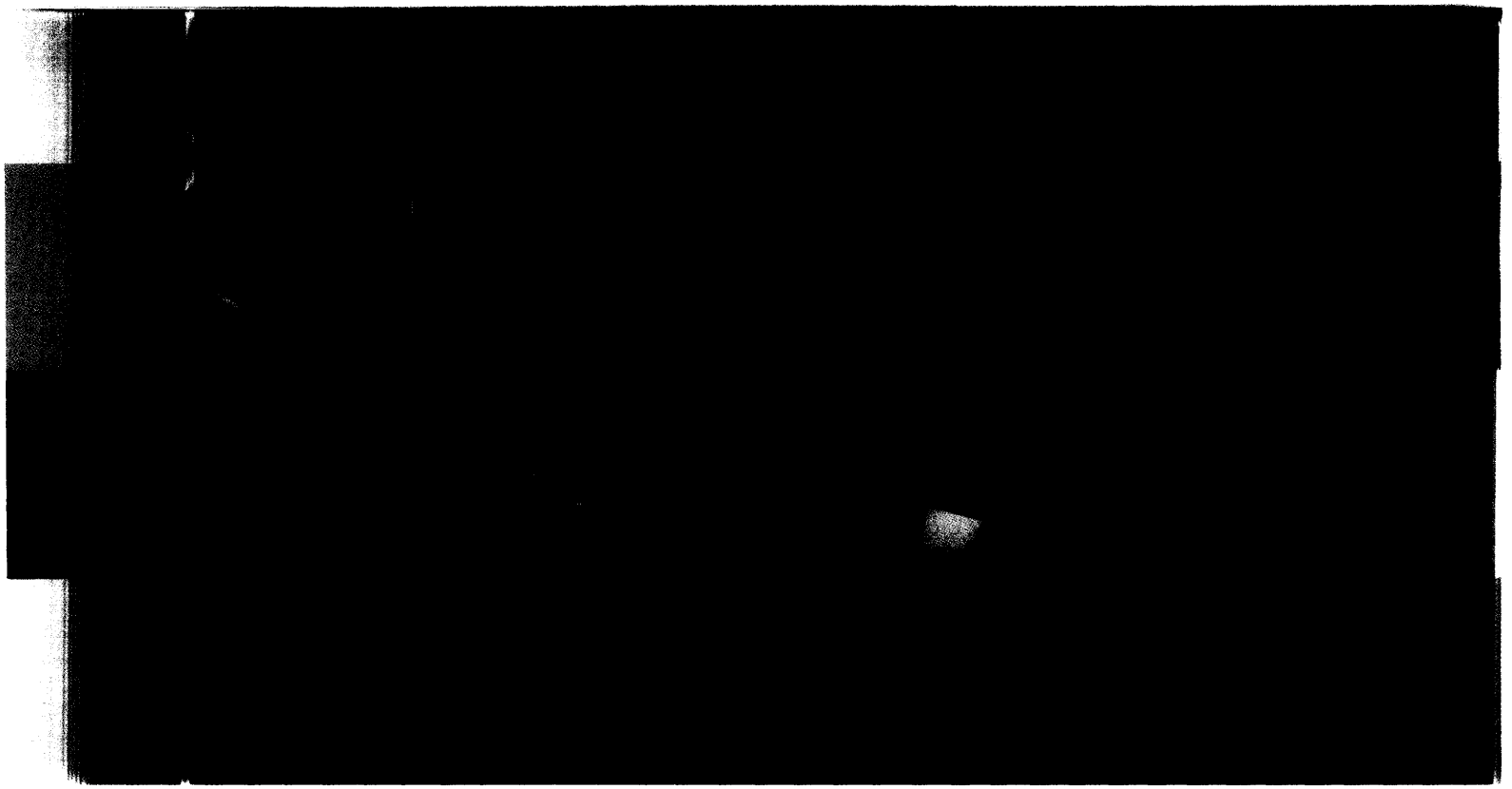
Only Incyte has LifeSeq® Public—free and enhanced public domain data linked to a proprietary, easy-to-use sequence database and clones.

Only Incyte has LifeSeq® Gold—120,000 gene transcripts (60,000 not available anywhere else), gene data based on actual expression, not prediction, and physical clones for every gene transcript.

Announcing a brand new site that provides you with the most powerful and complete view of the human genome. Plus, 24/7 access to the most up-to-date, highest quality data, reagents and supplies. Join us as we come together to create a dedicated online community of collaboration and dynamic online tools. Enhance your research. Accelerate your discovery. Achieve your breakthrough. **www.incyte.com**

IncyteGenomics
For Life.

Circle No. 31 on Readers' Service Card



Prime RNase Inhibitor
Your best defense against RNases

RNases are insidious proteins just lying in wait to destroy your experiments. You need the most powerful weapons to defeat them. DEPC and other treatment methods are great for destroying RNases that are already in solutions and on your labware but to fight the exogenous RNases that can ruin your experiments you need a more powerful weapon. That weapon is Prime RNase Inhibitor!

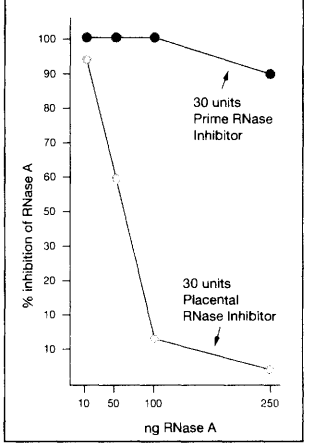
Prime RNase Inhibitor exhibits the same specificity as Human Placental RNase Inhibitor (HPRI) but has several advantages, including:

- Inhibits greater than 90% of RNase activity, where Human Placental RNase Inhibitors (HPRI) inhibit only 50%
- Stable under a broad range of pH concentrations
- Temperature stable to 65°C for at least 20 minutes
- Inhibits RNases A, B and C, and does not interfere with RNases T1, T2, H, U1, U2, or CL3
- Costs less than 1/2 the price of HPRI

Prime RNase Inhibitor works by non-covalently binding RNases and preventing RNA degradation. It can be used for all your RNA experiments including: *in vitro* transcription and *in vitro* translation, first and second strand cDNA synthesis, preparation of RNA and mRNA, and RT-PCR*. So contact your Eppendorf representative today, because the best defense is a superior offense.

For more information, visit us on the web at www.rnase.com.

Potency of Prime RNase Inhibitor compared to HPRI



8602-A101

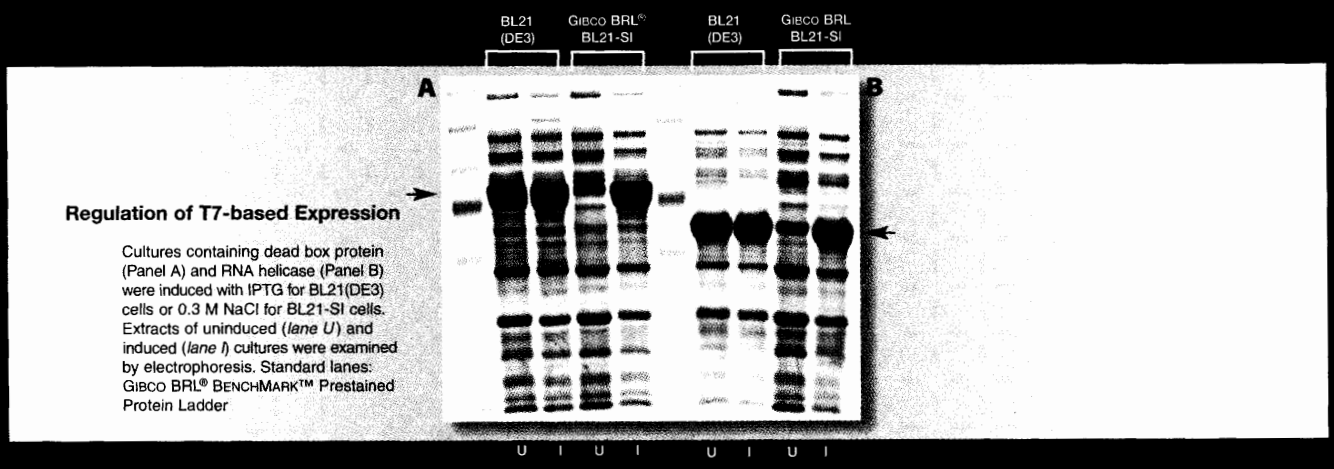
Eppendorf® is a registered trademark of Eppendorf-Netheler-Hinz GmbH.
* PCR is licensed under U.S. patent numbers 4,683,202, 4,683,195, 4,965,188, and 5,075,216 or their foreign counterparts, owned by Hoffmann-La Roche Inc. and F. Hoffman-La Roche Ltd.

eppendorf
Scientific
Specializing in cell and molecular biology.

Eppendorf Scientific, Inc. · One Cantiague Road · Westbury, NY 11590-0207 · Phone 800-421-9988 or 516-876-6800 · Fax 516-876-8599
e-mail: eppendorf@eppendorfsi.com · website: www.eppendorfsi.com
Eppendorf–Netheler–Hinz GmbH · 22331 Hamburg · Germany · Life Science Application-Hotline: +49 180-3666789 · Fax +49 40-538 01-556
e-mail: eppendorf@eppendorf.com · eppendorf home page: http://www.eppendorf.com

Circle No. 22 on Readers' Service Card

Q. How can you improve the performance of BL21 cells?



Regulation of T7-based Expression

Cultures containing dead box protein (Panel A) and RNA helicase (Panel B) were induced with IPTG for BL21(DE3) cells or 0.3 M NaCl for BL21-SI cells. Extracts of uninduced (*lane U*) and induced (*lane I*) cultures were examined by electrophoresis. Standard lanes: GIBCO BRL® BENCHMARK™ Prestained Protein Ladder

A. Just add salt.

Essential Technologies for Gene Expression

New GIBCO BRL® BL21-SI™ Competent Cells provide tighter regulation and better protein expression.

Want better control of recombinant protein expression? Use a dash of NaCl—or not.

New BL21-SI Competent Cells are unique. They allow expression of genes under the control of the T7 RNA polymerase gene by salt induction or by IPTG induction of the lac/taq promoter.

These cells are ideal for basic research and high throughput applications. Combine them with GATEWAY™ Cloning Technology for parallel expression of multiple gene products.

BL21-SI cells offer clear advantages over other BL21 strains, allowing you to:

- Precisely regulate protein expression via the salt-inducible *pro*U promoter
- Improve yield and solubility while lowering overall cost.
- Increase production of "difficult to express" or toxic proteins.
- Control the amount or rate of protein produced by modulating salt concentration.

Seasoned scientists control expression with BL21-SI Competent Cells. Order yours now. Catalogue No. 11665-015

U.S. Industrial Orders: To Order/TECH-LINE℠: (800) 874-4226 U.S. Academic Orders: To Order/TECH-LINE: (800) 828-6686 U.S. Government Orders: To Order/TECH-LINE: (888) 584-8929

These products are for laboratory research use only and are not intended for human or animal diagnostic, therapeutic, or other clinical uses, unless otherwise stated. © 2000 Life Technologies, Inc. 00-024MS

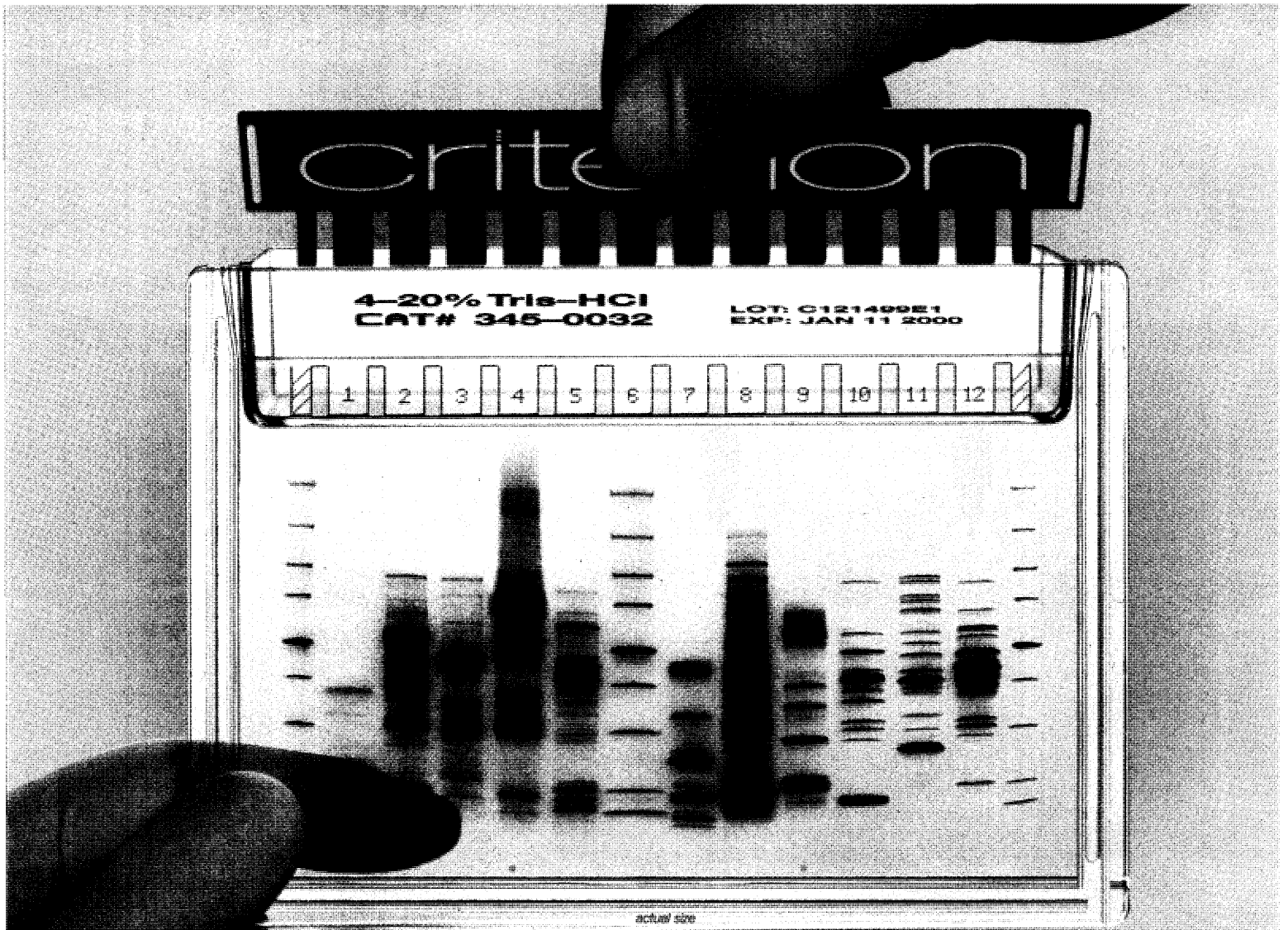
LIFE TECHNOLOGIES®

www.lifetech.com

Essential Technologies for the Science of Life™

Life Technologies® Services **BIOSEPRA®** **GIBCO BRL®**

Circle No. 21 on Readers' Service Card



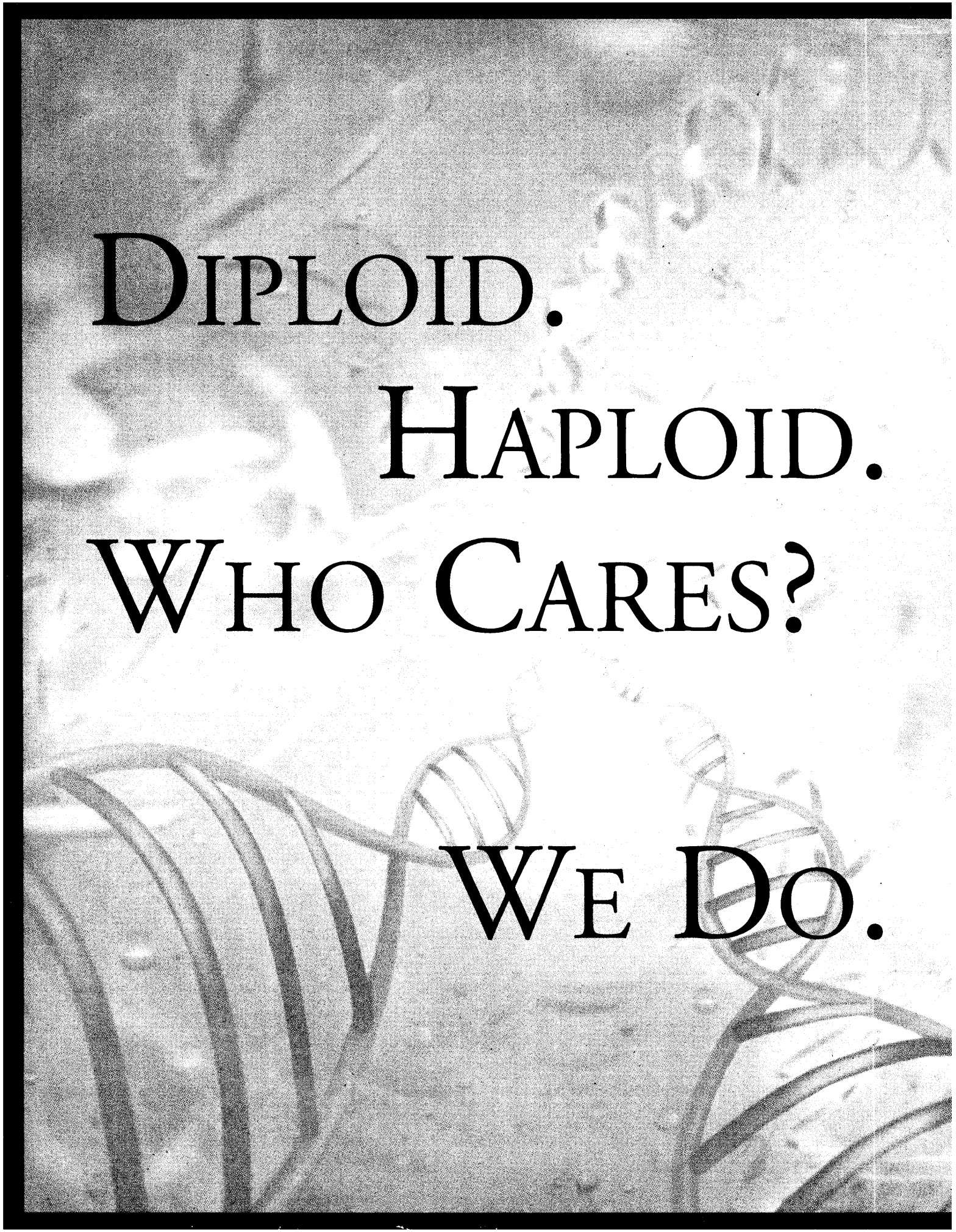
the incredible new precast gel system

Accelerate Your Research—Criterion Gels Have A Greater Capacity than Any Other Mini Gel.
Criterion sets the new standard for precast gel systems, exceeding all previous performance standards for precast gel electrophoresis. Easy-open cassettes and the patented leak-free design ensure unsurpassed quality and reproducibility, while highly visible wells simplify gel loading, further accelerating throughput. Have a question or want to set up a demo? Contact your Bio-Rad representative or sign up at **criterion.bio-rad.com**.

Visit our Life Science web site at discover.bio-rad.com.
Call toll free at 1-800-4BIORAD (1-800-424-6723); outside the US, contact your local sales office.

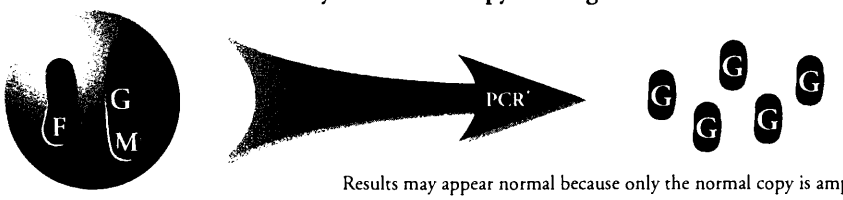
BIO-RAD

Circle No. 59 on Readers' Service Card


DIPLOID.
HAPLOID.
WHO CARES?
WE DO.

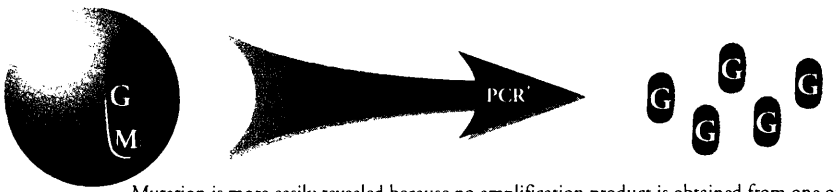
INTRODUCING GMP CONVERSION TECHNOLOGY™

In conventional gene testing, the missing or mutated gene is often masked or completely hidden by the normal copy of the gene.

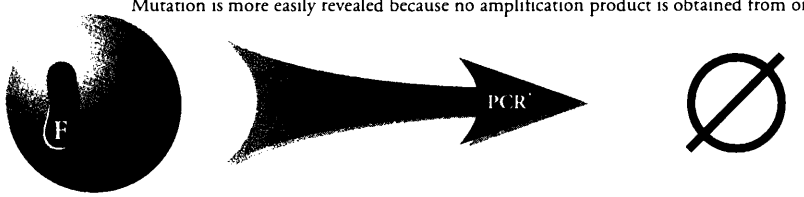


Results may appear normal because only the normal copy is amplified.

GMP CONVERSION TECHNOLOGY™ separates the two DNA sequences so they can be individually analyzed. The result: the mutation or deletion can more easily be detected.



Mutation is more easily revealed because no amplification product is obtained from one of the alleles.



GMP CONVERSION TECHNOLOGY™ is a diploid to haploid sample preparation process that separates genes into two differing natural forms as inherited from each parent. Published studies suggest that genetic testing on haploid samples detects abnormalities associated with certain hereditary diseases nearly 100% of the time.

Our technology, licensed from The Johns Hopkins University School of Medicine, is not a genetic test, nor is it a substitute for the many advanced methods available to search for mutations. Rather, it is a powerful new tool that dramatically increases the accuracy of genetic analysis and testing.

For more information call 1.888.467.4321 or visit our website.

GM CONVERSION TECHNOLOGY™

THE POWER OF ACCURACY.™

GMP GENETICS, INC.
1.888.467.4321 (TOLL-FREE)
email: info@gmpgenetics.com
www.gmpgenetics.com

©2000 GMP Companies, Inc. All rights reserved.

Circle No. 32 on Readers' Service Card

LOOKING FOR SUPERIOR RESEARCH ON THE WEB?
THE ANSWERS YOU NEED EMERGE AT INGENTA.COM

ingenta sets a new research standard. Easy access to a rich resource library of specialized journals and reports, the opportunity to interact with your peers through ingenta communities, and the ability to customize ingenta for your own information needs. High-quality, multi-level, timely research.

It's a powerful reason to visit **www.ingenta.com**

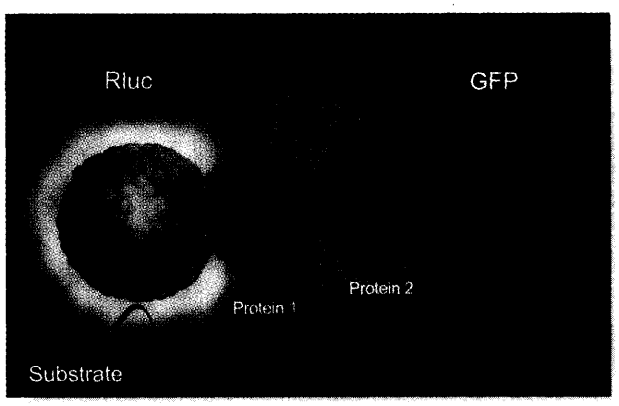
ingenta
Incorporating the UnCover company

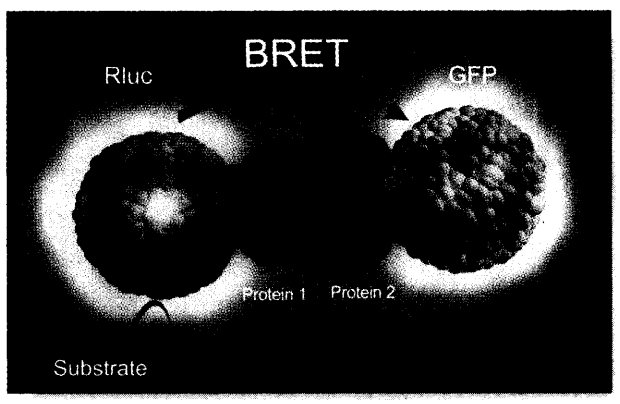
Circle No. 60 on Readers' Service Card

Introducing... BRET²™

Bioluminescence Resonance Energy Transfer

The next generation technology for Proteomics





Interaction between the two proteins brings Rluc and GFP fusions into proximity, resulting in energy transfer and light emission.

Advanced BRET² technology

- Whole cell functional assays
- Proximity interaction based on Renilla luciferase and GFP
- Bioluminescence, no excitation required
- Ratiometric measurement
- Large selection of vectors for easy assay assembly
- DeepBlueC™, new coelenterazine for a large Stokes shift

...for Proteomics applications

- Developed for mammalian cells
- Monitor protein-protein interactions (activation or inhibition)
- Measure interactions in all cell compartments
- Validate yeast 2-hybrid results
- Screening (HTS)
- Use our Gene2Screen™ contract services for your cell line development

The new Multimode Fusion Microplate Analyzer from Packard is optimized to detect all BRET² chemistries.

BioSignal Packard
A Packard BioScience Company

M3905

For more information on BRET² contact your local Packard office or visit our Web site at

www.biosignalpackard.com

®evolution

Life science researchers, unite!

A breakthrough in life science procurement is near. We're talking about an all-new business-to-business e-commerce solution. One developed in alliance with the National Institutes of Health to meet your specific supplies and equipment needs. One that uses all the power of the Internet to save you time and money. The revolution is BioSpace.com Supplies. Log on now to learn more.

BioSpace.com SUPPLIES

Global hubsite for the life sciences.

NEWS__STOCKS__JOBS__SUPPLIES__AUCTIONS__REAL ESTATE__COMMUNITIES

©2000 BioSpace.com, Inc.

Circle No. 35 on Readers' Service Card

Netscape: Welcome to BioNavigator

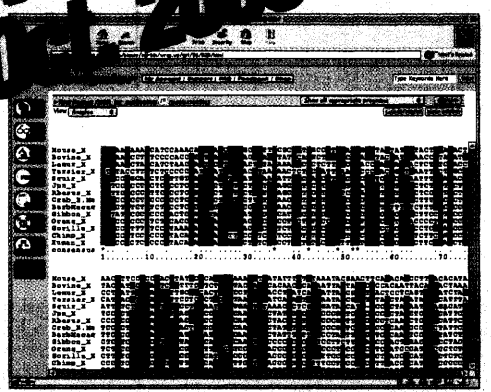
Back Forward Reload Home Search Netscape Images Print Security Shop Stop

Location: http://www.bionavigator.com/ What's Related

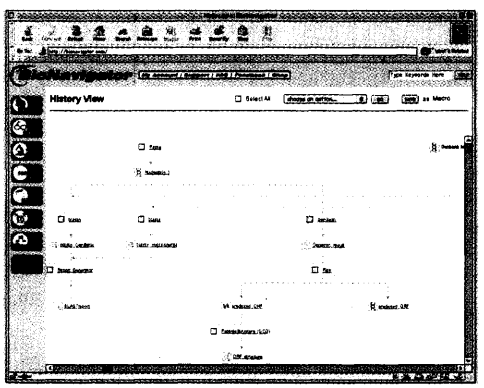
BioNavigator.com

The Best Value on the Internet

NEW Version Oct. 2000



Publication Quality Output: *Generate publication quality output in a format suitable for printing, editing and importing into posters, slide presentations and manuscripts.*



History View: *BioNavigator tracks each step of your analysis for automatic, accurate record-keeping. History Views can be saved as Macros, which will repeat your entire analysis on a new data set automatically. Share and import developed macros with your colleagues.*

Computer-based biological research via the internet offering:

Real Science

- Current Databases
- DNA and Protein Sequence Analysis
- Sequence Database Searching
- PCR Primer Design
- Molecular Modeling
- Phylogenetic Reconstruction and Evaluation
- Relevant e-Commerce Connections

Real Control

- Choose from Pre-assembled Analysis Protocols or Design Your Own
- Point & Click Menus Make Intricate Analysis Setup Easy & Understandable
- Change Any Setting or Go with Defaults
- Context-Sensitive Help Screens Explain Parameters & Settings
- On-Line Tutorials, Original References and Outstanding Support
- Publication Quality Output for Your Posters, Manuscripts

Real Time

- Interactive, Real-Time Interface
- History View Records Your Steps As You Work
- Convert History View into a Macro for Repeated One-button Multi-Step Analysis
- Complete Operational Consistency for Start-to-Finish Speed and Simplicity
- Automatic Analysis of Large Data Sets
- Completely Eliminate Reformatting Problems
- Use Your Favorite Browser, No Software to Download

Try It Yourself for FREE!

- FREE User Registration
- FREE Private File Storage
- FREE BLAST Against Current Databases
- FREE System Log-on Time
- FREE 100 Units So You Can Try It

www.bionavigator.com

Circle No. 42 on Readers' Service Card

BIOINFORMATICS

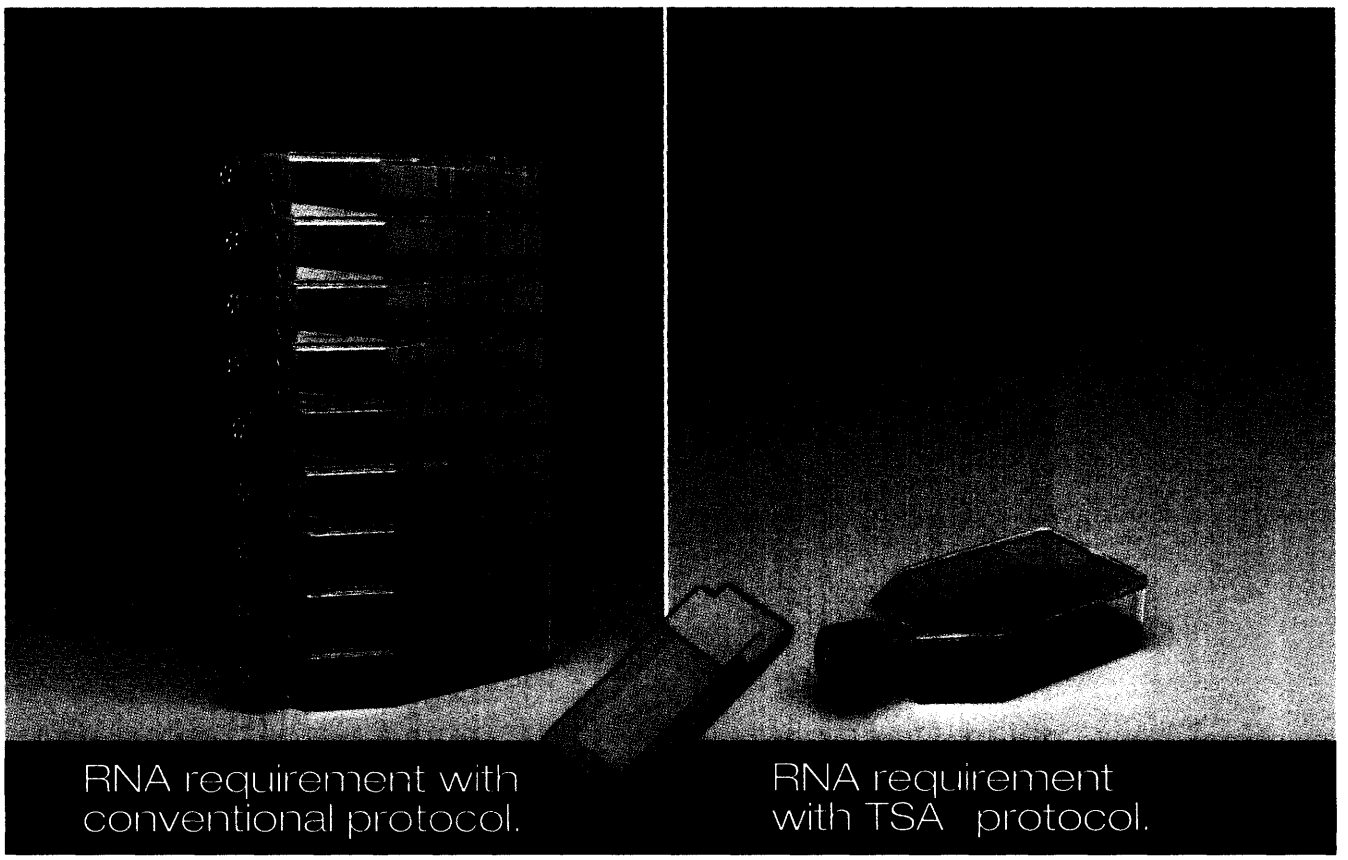
U.S. HEADQUARTERS • 6900 Koll Center Parkway, Suite 401 Pleasanton, CA 94566 • **Telephone:** (925) 426-9966 • **Freecall:** (877) EBIOINFO • **Freefax:** (888) 588-7446 • **Email:** info@ebioinformatics.com • **Internet:** www.ebioinformatics.com • **AUSTRALIA** • Suite 104, Bay 16 Australian Technology Park • Eveleigh NSW 1430 • **Telephone:** +61 2 9209 4740 • **Facsimile:** +61 2 9209 4741

Netscape and Netscape Navigator are registered trademarks of Netscape Communications Corporation in the United States and other countries. Netscape's logos and Netscape product and service names are also trademarks of Netscape Communications Corporation, which may be registered in other countries.

Drug Discovery | Research | Genetic Screening

▼

Microarrays



NEN's TSA Microarray Labeling and Detection Kit lets you do more with less.

PerkinElmer Family of Brands

NEN

MICROMAX™ A Family of Microarray Products

wallac

ReceptorBiology™

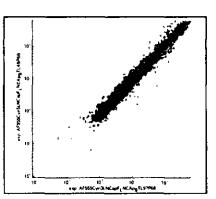
berthold

Doing more with less is critical in today's microarray applications, where the success of differential gene expression depends on the quality and quantity of starting RNA sample.

Now, PerkinElmer Life Sciences has introduced a new labeling and detection system for cDNA microarrays that lets you use lower amounts of total RNA than ever before—**as little as 0.5 - 1 µg!**

Using NEN's proprietary amplification technology, this new TSA Labeling and Detection Kit works with RNA from either tissue sources or cell lines. It contains key reagents in one complete, fully QC tested package, and provides significant **performance improvements** in accuracy and precision.

Don't let limited starting sample stop you. To learn more about how the new TSA Microarray Labeling and Detection Kit makes a little go a long way, call **1-800-551-2121**, or visit **nen.com/mm**.



Precise expression scatter plot with the same RNA population, allowing sensitive detection of differential expression at 2-fold or higher at 94%, or 3-fold or higher at 98%.

PerkinElmer™
life sciences.

Worldwide Headquarters: PerkinElmer Life Sciences, Boston, MA, USA (800) 551-2121

MICROMAX is a trademark of AlphaGene, Inc., and NEN Life Science Products, Inc. MICROMAX Human cDNA Systems are jointly developed by AlphaGene, Inc. and NEN Life Science Products, Inc., and are distributed exclusively by NEN Life Science Products, Inc. TSA and the use of TSA in microarray applications are protected by US Patents issued to NEN, 5,731,158; 5,182,203; 5,583,001; and 5,196,306 and foreign equivalents, and patents pending. ©2000 PerkinElmer, Inc.

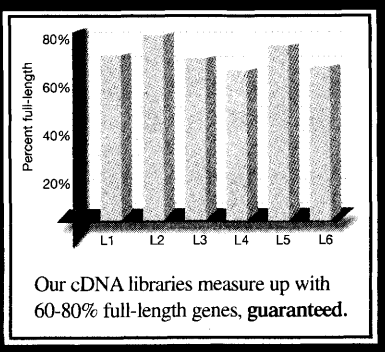
www.perkinelmer.com/lifesciences

Circle No. 46 on Readers' Service Card

Guess where genomics leaders get their full-length genes.

Many of the most prominent names in genomics are reaching their research objectives faster with help from Life Technologies® Services.

Through collaborative partnerships and fee-for service arrangements, they gain access to our recognized expertise, including our proprietary full-length cDNA and universal cloning technologies.



Our cDNA libraries measure up with 60-80% full-length genes, **guaranteed.**

What we do for them, we can do for you:

- Construction of cDNA libraries with 60-80% full-length genes
- Normalization of cDNA libraries enriched for novel genes
- High-throughput isolation of full-length genes from multiple tissue and cell sources
- Isolation of novel members of gene families
- Cloning and vector conversion using GATEWAY™ Cloning Technology
- Protein expression services

The faster you put us to work, the faster we can deliver the results you need to succeed.
Contact info.services@lifetech.com

Essential Technologies for Gene Discovery

U.S.: (800) 874-4226, extension 8300 **Europe:** 00 44 (0) 141 814 6100 **Japan:** 03-3663-8241
The custom products produced through these research projects are covered by a Limited Label License.

© 2000 Life Technologies, Inc. 00-057MS

LIFE TECHNOLOGIES®

www.lifetech.com

Essential Technologies for the Science of Life™

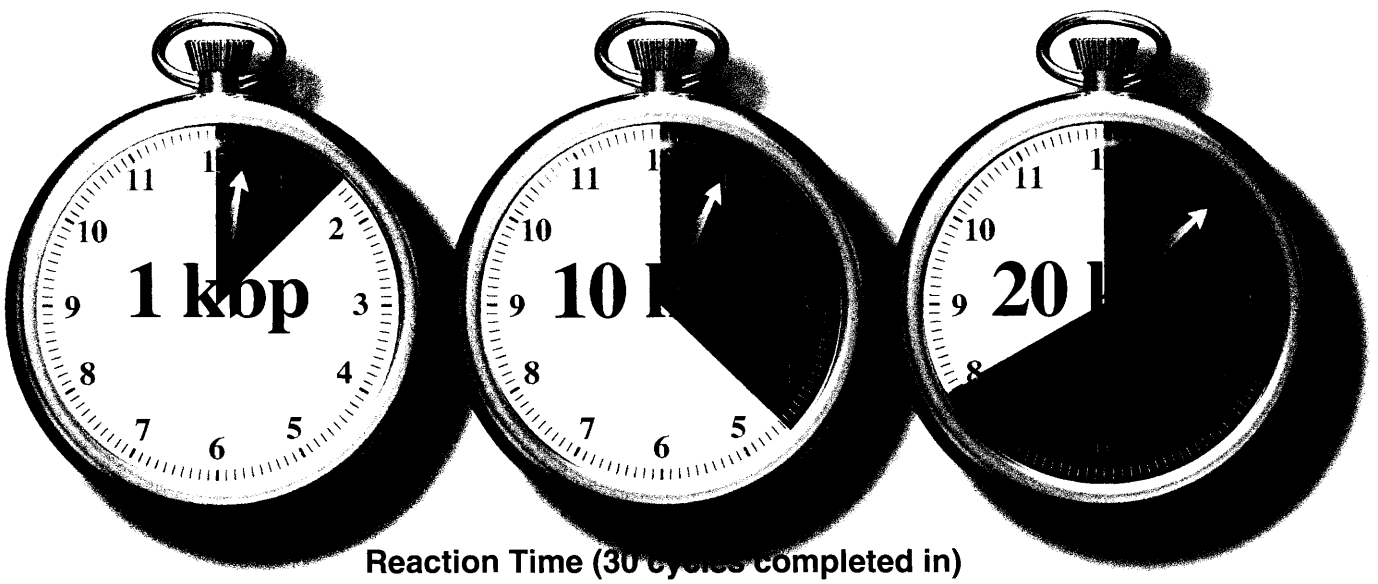
Life Technologies® Services **BIOSEPRA®** **GIBCO BRL®**

Circle No. 28 on Readers' Service Card

TaKaRa Z-Taq™

Today's Research for Tomorrow's Revolution

The Fastest DNA Polymerase Ever



Reaction Time (30 cycles completed in)

■ *TaKaRa Z-Taq*™ ■ Conventional *Taq*

Speed Comparison in Amplifying *E. coli* Genomic DNA (100 ng/50 µl PCR)

TaKaRa Z-Taq™ (R006A: 200 U, R006B: 200 U x 4)

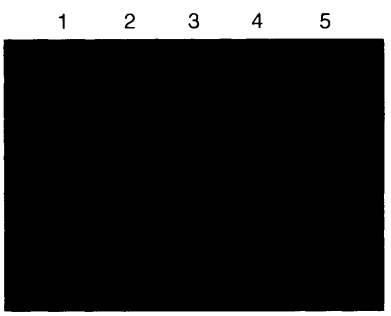
- Offers Unmatched PCR Productivity by any other enzyme at **Five times Faster Speed** with Excellent Processivity and Higher Sensitivity.

Amplification Length Achieved	
Human genomic DNA	17.5 kbp and longer
E. coli genomic DNA	20 kbp and longer
λ DNA	20 kbp and longer

- *TaKaRa Z-Taq*™ provides High-throughput to enable multiple runs of sample processing on a single cycler* each day. *Applicable to any thermal cycler currently in use
- Highly Efficient and Cost-effective PCR processes will accelerate genetics applications in every related field.

Amplification of *E. coli* Genomic DNA (100 ng/50 µl PCR) with *TaKaRa Z-Taq*™

on the TaKaRa PCR Thermal Cycler PERSONAL by performing 30 cycles: Using 5 sec-denaturation time at 98° C, extension times are 2 sec, 70 sec and 150 sec at 68° C, respectively for 1 kbp, 10 kbp and 20 kbp.



Lane (5 µl applied for the Electrophoresis)

1. pHY marker
2. 1 kbp
3. 10 kbp
4. 20 kbp
5. λ -*Hin*d III marker

Purchase of the *Takara Z-Taq* is accompanied by a limited license to use it in the Polymerase Chain Reaction (PCR) process for research in conjunction with a thermal cycler whose use in the automated performance of the PCR process is covered by the up-front license fee, either by payment to Perkin-Elmer or as purchase, i.e., an authorized thermal cycler.

TaKaRa
TAKARA SHUZO CO.,LTD.
BIOMEDICAL GROUP
Otsu, Shiga, Japan
Phone:+81 77-543-7247 Fax:+81 77-543-9254

Korea
BOHAN (TaKaRa-Korea) Biomedical Inc.
Phone: (02) 577-2002 Fax: (02) 577-3691
Europe
TaKaRa Biomedical Europe S.A.
Phone: +33 1 41 47 01 14 Fax: +33 1 47 92 18 80

DISTRIBUTORS

USA and the Americas
PanVera Corporation
Toll Free: 800-791-1400
Fax: 608-233-3007
E-mail : info@panvera.com

Europe
BioWhittaker Europe
Phone: +32(0)8732 1611
Fax: +32(0)8735 1967

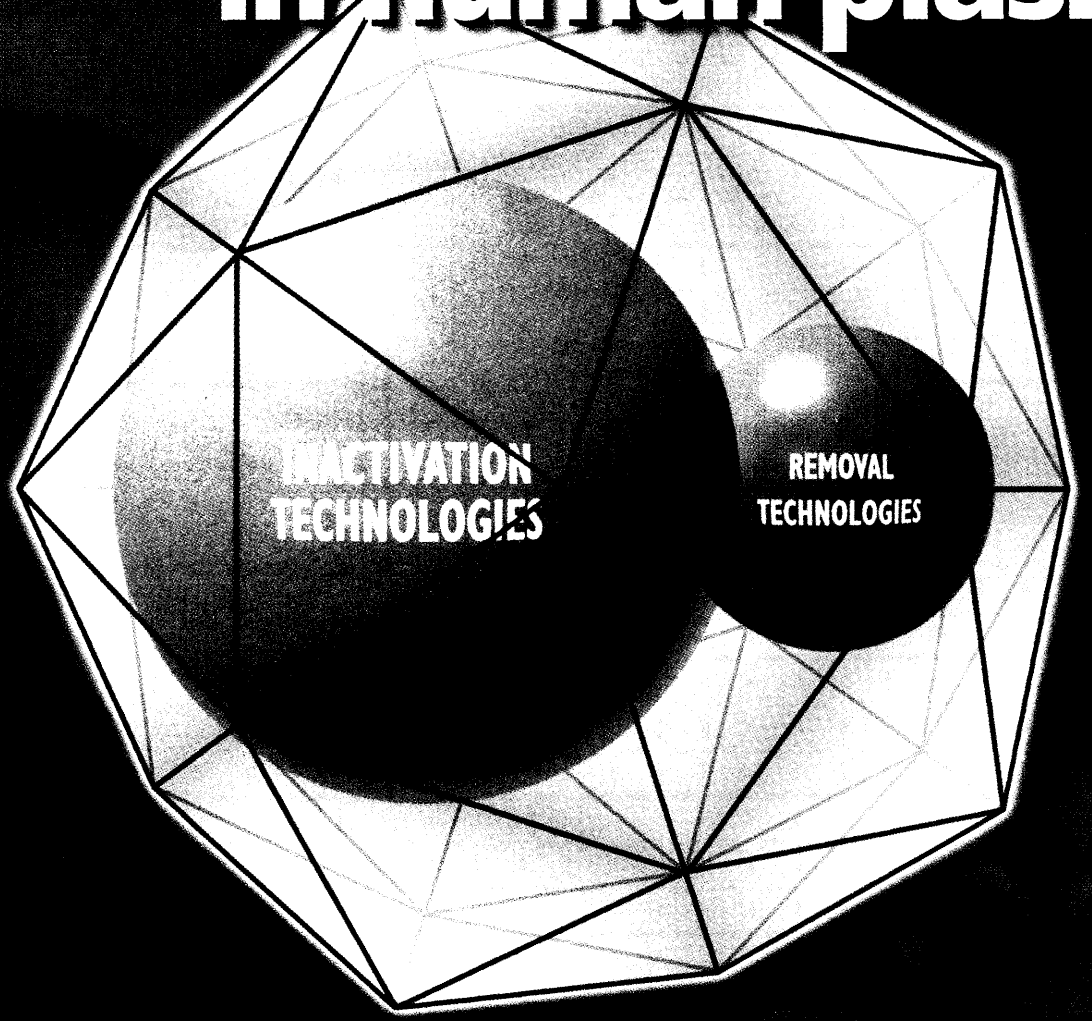
Taiwan
Cold Spring Biotechnology Co.,Ltd.
Phone: +886 2-695-9990
Fax: +886 2-695-9963

Taiwan
Cheng Chin Trading Co.,Ltd.
Phone: +886 2-331-3111
Fax: +886 2-382-2197

Homepage: http://www.takara.co.jp/english/bio_e/ E-mail: bio-sm@takara.co.jp

Circle No. 10 on Readers' Service Card

Eradicate pathogens in human plasma



Research Funds Available

The Consortium for Plasma Science seeks an effective, safe and practical method to eradicate non-enveloped viruses in whole human plasma that retains the biofunctionality of the plasma proteins.

Applications may be submitted at any time, and will be evaluated on both technical merit and the business case.

CONTACT:
Frederick A. Dombrose, Ph.D.
Executive Director
5925 Carnegie Blvd.
Suite 500
Charlotte, NC 28209 U.S.A.
Phone: 704.571.4070
Fax: 704.571.4071
E-mail: fdcps@aol.com
Web: www.plasmaconsortium.com

Consortium for Plasma Science, LLC

Circle No. 20 on Readers' Service Card

RETIREMENT | INSURANCE | MUTUAL FUNDS | TRUST SERVICES | TUITION FINANCING

They say the universe is expanding.

Wouldn't it be nice if your portfolio kept pace?

Unlike the universe, a steady growth in your finances won't just happen of its own accord. You need to take matters into your own hands.

We can help. TIAA-CREF has been helping people in education and research reach their financial goals for over 80 years. And now, through our group of companies, we can help everyone. Whether you're looking for mutual funds, annuities, trust services, or insurance (to name just a few), you can join the millions of people who already benefit from our long-standing commitment to strong performance, low expenses and outstanding customer service.

If you'd like to expand your horizons, call us at **1 800 842-1924** or visit us online at **www.tiaa-cref.org**.

TIAA CREF

Ensuring the future for those who shape it.℠

1 800 842-1924 dept: ME6 | **www.tiaa-cref.org**

For more complete information on our securities products, call 1 800 842-1924 for prospectuses. Read them carefully before you invest. • TIAA-CREF Individual and Institutional Services, Inc. and Teachers Personal Investors Services, Inc. distribute securities products. • TIAA and TIAA-CREF Life Insurance Co., New York, NY issue insurance and annuities. • TIAA-CREF Trust Company, FSB provides trust services. • **Investment products are not FDIC insured, may lose value and are not bank guaranteed.** © 2000 TIAA-CREF 09/19

Circle No. 39 on Readers' Service Card

PCR clean-up.

Why waste time with it when you can

Fig. 1. Fluorescent sequencing results of a 100 bp pUC18 PCR fragment sequenced with a -20 Fwd primer using the DYEnamic ET Terminator Cycle Sequencing Kit (Amersham Pharmacia Biotech). Data generated for USB by Cleveland Genomics (clevelandgenomics.com), a research service company. PCR clean-up performed with: (a) ExoSAP-IT; (b) a column designed for PCR clean-up. Base miscalls in (b) are due to inherently low yields of short PCR products when using columns.

Fig. 2. Autoradiograms of a 20.7 kb Lambda PCR fragment sequenced with MBL202 Fwd primer using USB's Thermo Sequenase Radiolabeled Terminator Cycle Sequencing Kit. PCR clean-up performed with: (a) ExoSAP-IT; (b) a column designed for PCR clean-up.

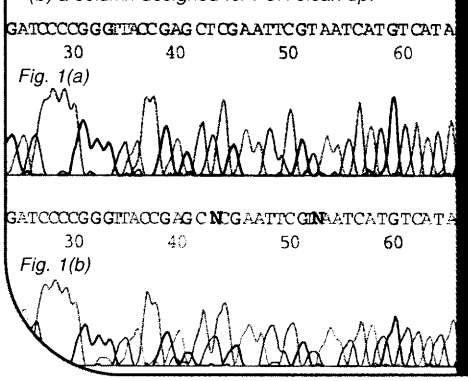


Fig. 1(a)

Fig. 1(b)

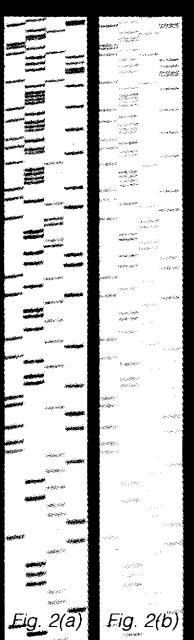


Fig. 2(a) *Fig. 2(b)*

- One Tube/One Step PCR clean-up
- 100% recovery of both small and long PCR products
- Economical for high throughput purification
- Less hands-on time than other methods
- Scaleable to handle large volumes

usb
Rediscover the chemistry™

Need an easy way to clean-up PCR† products, especially before sequencing? Without using a column or beads? And, without losing product? USB has a solution. Just ExoSAP-IT™‡ using Exonuclease I to degrade primers, and Shrimp Alkaline Phosphatase to degrade the dNTPs - both enzymes in one tube. A single pipeting step is all it takes to treat the PCR template. Just add ExoSAP-IT to your PCR product and within 30 minutes, sequence with either fluorescent or radioactive reagents.

To purchase outside the United States, please contact USB's authorized distributor, Amersham Pharmacia Biotech. Please visit our website at www.usbweb.com for regional information.

©2000 USB Corporation. USB and logo design are registered trademarks of USB Corporation. ExoSAP-IT and the phrase 'Rediscover the chemistry' are trademarks of USB Corporation.

USB Corporation
26111 Miles Road
Cleveland, OH 44128
800.321.9322
www.usbweb.com

† The Polymerase Chain Reaction (PCR) is covered by patents owned by Roche Molecular Systems and F. Hoffmann-La Roche Ltd. ‡Patent pending on product. The method of use is covered by the following patents: 5,756,285 and 5,741,676.

Circle No. 12 on Readers' Service Card

Nucleic Acids Research

NAR is universally renowned for the quality of its articles, authoritative reviews, and as a front runner in applying new technologies to the publishing process. NAR prides itself on the high standard of service it provides, both for its authors and its readers.

Nucleic Acids Research publishes the results of leading edge research into physical, chemical, biochemical and biological aspects of nucleic acids and the proteins that regulate or interact with them.

BENEFITS FOR READERS:

Free online access

If your library has a print subscription and has completed the registration process for a site licence, you can access NAR from your own desktop anywhere in your organisation **AT NO CHARGE TO YOURSELF**.

Free NAR contents e-mail alerting service

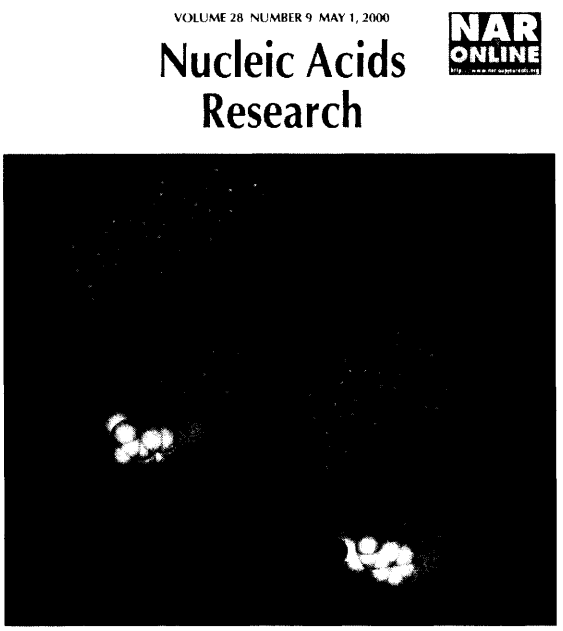
Join the NAR table of contents alerting service and receive the contents of each issue by e-mail in advance of print publication.

To register for this free service, simply go to **www.oup.co.uk/jnls/tocmail**, select NAR from the list of Oxford University Press journals, and enter your e-mail address.

Remember, you do not have to subscribe to take advantage of this service.

Free database issue

You can access the annual NAR Database Issue (January 2001) completely free of charge on the NAR web site. This issue provides descriptions of, and links to, over 100 databases of relevance to working biologists.



FOR FURTHER INFORMATION PLEASE CONTACT:

Journals Marketing Department
Oxford University Press
Great Clarendon Street
Oxford OX2 6DP UK
Telephone: +44 1865 267907
Fax: +44 1865 267835 Email: jnl.info@oup.co.uk

In the Americas, please contact:
Journals Marketing Department
Oxford University Press
2001 Evans Road, Cary NC 27513 USA
Telephone: 1 800 852 7323 (USA and Canada only)
or 919 677 0977 (outside the USA and Canada)
Fax: 919 677 1714 Email: jnlorders@oup-usa.org

NAR Methods Online

As a subscriber, you can access NAR Methods Online, an online database of Methods papers (fully citable and covered by ISI and Medline). Just visit **www.oup.co.uk/nar/methods/?s100**

BENEFITS FOR AUTHORS:

- **Large audience**
- **High impact factor**
- **Fast decisions**
- **Fast publication**
- **Free colour**
- **Supplementary material online**

FULL TEXT ONLINE

www.nar.oupjournals.org/?s100

Visit the web site to:

- **View a sample issue**
- **Access subscription information**

You can also:

- **View the current issue**
- **Browse the archive**
- **Search for articles**
- **View abstracts**
- **Join the free e-mail table of contents alerting service**
- **Access the instructions for authors**
- **Register for online access**

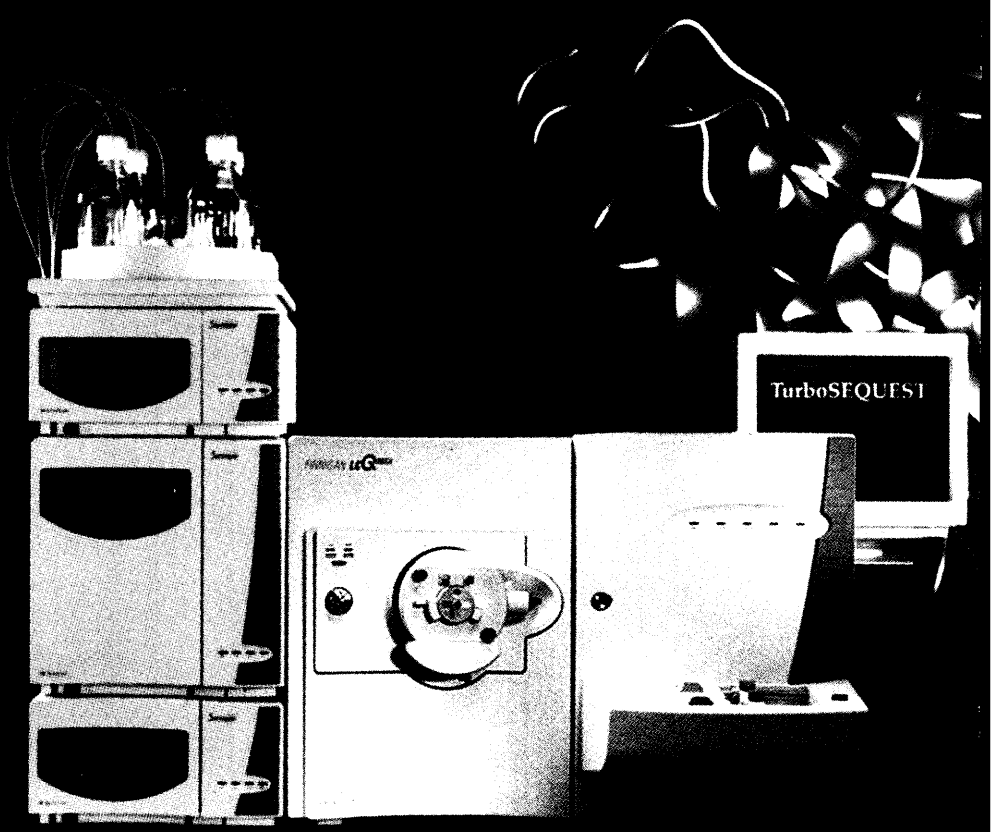
Circle No. 37 on Readers' Service Card

www.nar.oupjournals.org/?s100

OXFORD
UNIVERSITY PRESS

TIME TO CATCH
THE PROTEOME EXPRESS™
HIGH SPEED PROTEIN IDENTIFICATION AND QUANTITATION

Our Fast^n System for Proteomics is simply the most powerful integrated LC/MS^n system for protein analysis you can use. Every component of the system raises the standard. The new Surveyor™ LC was designed especially for the Finnigan LCQ™ mass spectrometers, giving you single point control with Xcalibur™ software. The ultra-sensitive Finnigan LCQ DECA with the *new* nanospray source allows the routine analysis of femtomole sample amounts. And, our TurboSEQUEST® software rapidly searches protein and nucleotide libraries to identify your proteins with lightning speed. All this will reduce your analysis time significantly. There is a reason all the papers cited here depended upon ThermoQuest for their results. When you are on the leading edge, you need state-of-the-art tools that have the power to capture your vision. Learn more at www.thermoquest.com



5 Breakthrough Papers In Proteomics

ALL FEATURING FINNIGAN LCQ™ MASS SPECTROMETERS AND SEQUEST® PROTEIN IDENTIFICATION SOFTWARE

Complex Mixtures

Link AJ, Eng J, Schieltz DM, Carmack E, Mize GJ, Morris DR, Garvik BM, Yates JR III.
Nature Biotechnology, Vol. 17, 676-682, July 1999

Protein Quantification

Gygi SP, Rist B, Gerber SA, Turecek F, Gelb MH, Aebersold R.
Nature Biotechnology, Vol. 17, 994-999, October 1999

Polymorphisms

Gatlin CL, Eng JK, Cross ST, Detter JC, Yates JR III.
Analytical Chemistry, Vol. 72, 757-763, February 15, 2000

Membrane Proteins

Simpson RJ, Connolly LM, Eddes JS, Pereira JJ, Moritz RL, Reid GE.
Electrophoresis, Vol. 21, 1707-1732, May 2000

Post-translational Modifications

Wu X, Ranganathan V, Weisman DS, Heine WF, Ciccone DN, O'Neill TB, Crick KE, Pierce KA, Lane, WS, Rathbun G, Livingston DM, Weaver DT.
Nature, Vol. 405, 477-482, May 25, 2000

ThermoQuest

IN THE COMPANY OF SCIENTISTS™

www.thermoquest.com • 1.800.532.4752

Australia Tel. (61) 2 9898 9000 • Austria Tel. (43) 1 333 50340 • Belgium Tel. (32) 3 825 0670 • Canada Tel. (800) 721 4260 • France Tel. (33) 1 69 18 88 10 • Germany Tel. (49) 6103 4080
Italy Tel. (39) 02 95059 1 • Japan Tel. (81) 3 3372 3001 • The Netherlands Tel. (31) 76 5878 722 • People's Republic of China Tel. (86) 10 6621 0839 • Spain Tel. (34) 91 657 4930
Sweden Tel. (46) 8 680 0101 • Switzerland Tel. (41) 61 487 8400 • United Kingdom Tel. (44) 1442 233555 • United States Tel. (800) 532 4752

Circle No. 36 for Literature. Circle No. 51 for a Sales Representative to call.

Portable

Life in the fast lane. It usually involves a few sacrifices. Your insurance coverage doesn't have to be one of them. Whether you're moving on or even out on your own, insurance offered through your AAAS membership won't end just because you've changed jobs. It travels right in your back pocket.

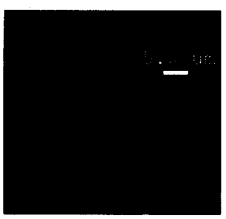
Take advantage of one of your best membership benefits. Affordable coverage. Reliable providers. Portable benefits. Call 800-424-9883 to speak to a customer service representative. Because an established benefits package fits your changing lifestyle.

American Association for the Advancement of Science

TERM LIFE INSURANCE FOR AAAS MEMBERS

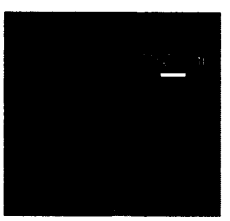
This program is administered by Seabury & Smith, a Marsh & McLennan Company. This plan may not be available in all states. The term life insurance plan is underwritten by New York Life Insurance Company, 51 Madison Avenue, New York, NY 10010.

Circle No. 30 on Readers' Service Card

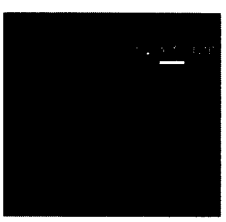


Patch Clamp Pipette

The **P-97**
Micropipette Puller



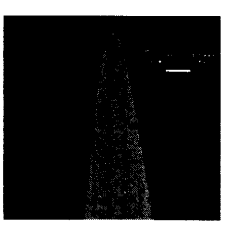
Intracellular Electrode



Transgenic Needle

Make the tips you want when you need them!

See our web site for more information about the P-97, and other Sutter products.



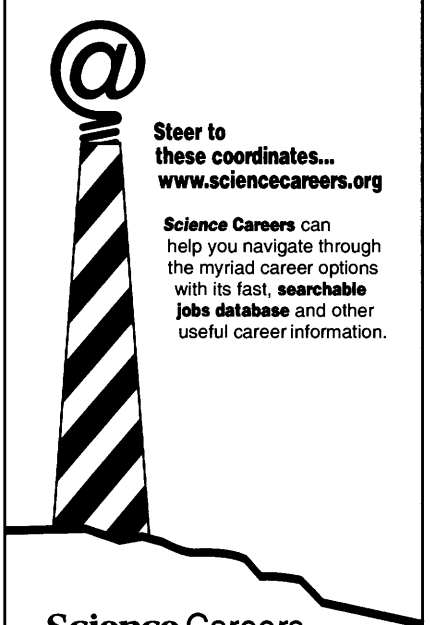
Nanospray Tip

PRECISION INSTRUMENTATION FOR THE SCIENCES

SUTTER INSTRUMENT COMPANY
51 DIGITAL DRIVE, NOVATO, CA. 94949 PHONE: 415.883.0128
FAX: 415.883.0572 EMAIL: INFO@SUTTER.COM WEB:WWW.SUTTER.COM

Circle No. 55 on Readers' Service Card

Chart the right course for your career.



Steer to these coordinates... www.sciencecareers.org

***Science* Careers** can help you navigate through the myriad career options with its fast, **searchable jobs database** and other useful career information.

Science Careers
www.sciencecareers.org


everything you need to know about
the biotechnology industry...online
Showcase your company for 12 full months with an online Storefront... compliments of Microsoft and VerticalNet! See site for details!
bioresearchonline.com gives people in the biotechnology industry everything they need:
• Instant buying access to thousands of vendors and suppliers the world over
• Unlimited sales opportunities through customized Storefronts, E-Commerce Centers and other services
• Breaking news—including regulatory info—and the latest technology
www.bioresearchonline.com
• Hot job postings and career opportunities
• Links to the Internet's leading scientific trading community:
All delivered on time, on target, and totally FREE. Become a part of the online community that's 100% focused on the biotechnology industry. And while you're there, check out our sales-building, no-cost Storefront solution.
VerticalNet
Leading Business to E-Business
©2000 VerticalNet, Inc. All rights reserved.
E 36-06043 SCM
Circle No. 17 on Readers' Service Card

DAIN RAUSCHER WESSELS
SELECTED BIOTECHNOLOGY TRANSACTIONS

$122,360,000 GENOMICA Initial Public Offering September 2000	**$67,200,000** TRANSGENOMIC Initial Public Offering July 2000	**$52,080,000** GENOMIC SOLUTIONS™ Initial Public Offering May 2000	**$82,500,000** Nanogen Follow-On Offering March 2000
$358,837,580 *MEDAREX, INC.* Follow-On Offering March 2000	**$76,500,000** **Luminex** Initial Public Offering March 2000	**Research Genetics** has been acquired by Invitrogen Corporation February 2000	**$47,500,000** Athersys Private Placement Class F Convertible Preferred Stock February 2000
Invitrogen **$150,000,000** Convertible Subordinated Debt **$147,500,000** Follow-On Offering February 2000 October 1999	**$235,200,000** GENE LOGIC Follow-On Offering January 2000	**$125,000,000** CuraGen Corporation Convertible Subordinated Debt January 2000	GENOSYS has been acquired by Sigma-Aldrich Corporation December 1998

DAIN RAUSCHER WESSELS
BIOTECHNOLOGY INVESTMENT BANKING

Menlo Park
(650) 234-4120

David Volk
Head of Biotechnology Investment Banking

Mohamad Tabrizi
Corporate Finance

Minneapolis
(612) 371-2711

Michael Kessler
Head of Healthcare Investment Banking

Todd Nelson
Head of Biotechnology Research

Edward Lagerstrom
Mergers & Acquisitions

DAIN RAUSCHER WESSELS
EQUITY CAPITAL MARKETS

a division of Dain Rauscher Incorporated
MEMBER NYSE/SIPC

Atlanta • Austin • Boston • Dallas • Houston • Menlo Park • Minneapolis • New York • Paris • San Francisco • Tel Aviv – *Strategic alliance with Tamir Fishman & Co.*

Circle No. 48 on Readers' Service Card

www.dainrauscherwessels.com